1994
VOLUME 3

Advertisers Technical Data

IC MASTER

- Manufacturers & Distributors Directory
- Military Parts Directory
- Application Note Directory
- Advertisers Technical Data

VOLUME 1
Selection Guides & Function Index

VOLUME 2
Part Number Index/Guide & Alternate Sources

Hearst Business Publishing / UTP Division

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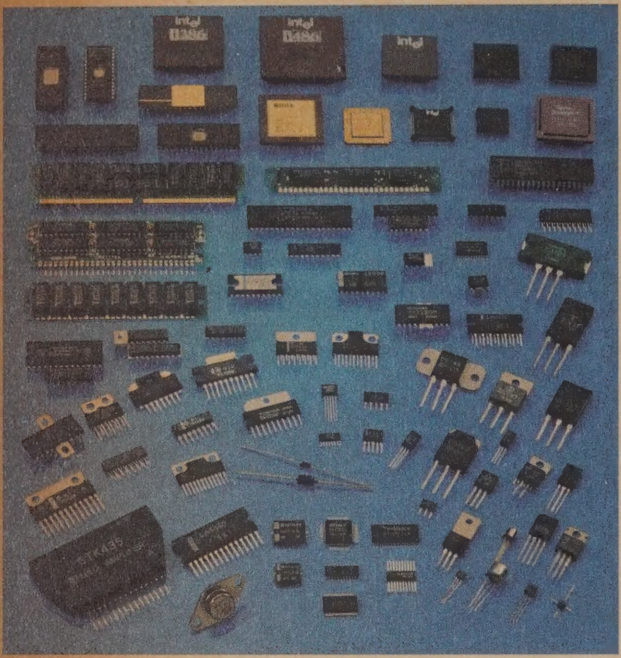

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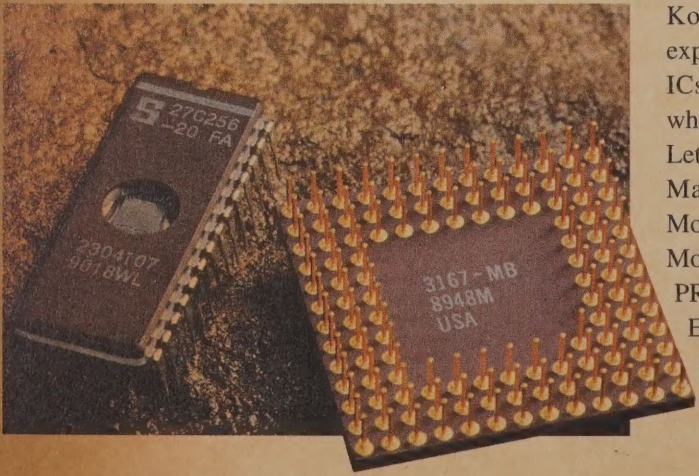

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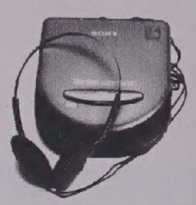
We Want Your Feedback

Win this Sony Discman®



by taking a few minutes to help us*

Dear IC Master User,

Give us some feed back and you might win a Sony Discman®. We need your input to keep improving IC Master. You, the user of IC Master, are the person we must satisfy now and meet your needs into the future.*

Please take a few minutes the next time you use IC Master and complete the following questionnaire. We'll put all respondents names in a drawing each month for the CD Player.

Thank you for your time and help,

Armand Villiger, Publisher

IC Master Feedback

Tell us about your most recent use of IC Master

1. How did you use IC Master most recently?
(be as specific as possible)

____

____

____

2. What company information did you use?

Companies referred to in IC Master	Referred to data sheets in Volume 3	Contacted manufacturer	Contacted distributor
____________	☐	☐	☐
____________	☐	☐	☐
____________	☐	☐	☐
____________	☐	☐	☐
____________	☐	☐	☐
____________	☐	☐	☐

3. How many others at your location use IC Master?
__________ Other IC Master Users

4. Any other comments:

____

____

____

** Every month from April through December 1994 we'll have a drawing for a Sony Discman® Portable Compact Disc Player. We'll include all questionnaires received for the month prior to the drawing. You can enter as many times as you wish, but each questionnaire must be for a different usage of IC Master. Please make sure you include your name, address, phone & fax so we can contact you if you are selected.*

All responses are completely confidential. However, we do need your name and address so that we can contact you if you're a lucky winner.

Name ______________________

Title ______________________

Company ______________________

Address ______________________

____

City ____________ State ____ Zip ______

Country ____________ Postal Code ________

Phone ______________________

Fax ______________________

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HOW TO USE THE IC MASTER

The 1994 edition of the IC MASTER is arranged in three volumes. Each volume serves a specific purpose to help you find the integrated circuit or related product you need. The table of contents on the preceding page describes what is in each volume. The table of contents for Volume 3 also gives the starting page numbers for advertisers' data pages.

The IC MASTER is a functional work. You know what you need. The MASTER helps you find it.

Here are typical problems.

Q. What kinds of functions does the MASTER cover?
A. Turn to page 10 in Volume One. Here is a functional index for the devices covered. The page and line numbers refer you to the exact location within a Section in which a particular function appears.

Q. Who makes a 16K x 1 static RAM with an access time of 70 ns or faster? What are my technology choices?
A. Turn to the MEMORY section, in Volume 1. The first page of the section tells you where the listings of your device begin.
Turn to Static RAMs — General Purpose, and browse through the pages until you reach the 16K x 1 listings. Now look through the listings until you find the access time and characteristics you need. Device numbers are shown by manufacturer. The device numbers of advertisers in the 1994 IC MASTER appear in bold face. The page number following the device number is where additional information may be found in Volume Three. At the extreme right you will see line numbers. These are the specific lines where a device appears.

Q. Which microprocessors are listed in the MASTER? How do I find the microprocessor I need?
A. All commercially available microprocessors are listed in the MASTER. Start with the **microprocessor** listing in the **Master Selection Guide Function Index** (starts on page 10). Here you will find CISC, RISC and Microcontrollers listed according to clock rate. Turn to the various pages shown and then to the advertisers' page where more information may be available.

Q. Who makes a Dual, Low Offset Voltage Op Amp?	A. This is a **LINEAR** device. Turn to the LINEAR section in Volume One. The first page of the section shows the starting page for each category. Turn to the page where Dual Units appear. Look down the list for the device you need. Advertisers' devices are listed in bold face. Turn to the page in Volume Three where more information may be available.
Q. I need an IC with Music capability. Which Master Selection Guide should I use?	A. Turn to the **Master Selection Guide Function Index** starting on page 10. Look through the list until you find **Music.** The page numbers for each kind of device are shown.
Q. I am looking for an application note on a specific device. Where can I find out if one is currently available?	A. Pick up Volume Three. Turn to the Application Note Directory. Here you will find application notes arranged by **function**. Find the function involved and turn to the page where the note is listed.
Q. We need a device that meets MIL standards. Where do I look in the MASTER?	A. Turn to the MILITARY section in Volume Three. The first part lists manufacturers and screening levels available. The second part is a functional index. The last two sections provide cross references from commercial to military and military to commercial part numbers.
Q. I know the basic part number is 2502 and that's all I know. Where do I look?	A. Go to the Part Number Index in Volume 2. All prefixes and suffixes have been stripped away. Turn to the page where 2502 appears. All manufacturers with that base number appear in order along with the full part number and the page and line number where the device is described.
Q. How many manufacturers claim to make a pin-for-pin and function-for-function equivalent to a Motorola MC68000?	A. Turn to the Alternate Source Directory in the back of Volume Two. Turn to Motorola's listings. Those manufacturers who claim to have equivalent parts are listed in order. If you have an IBM or compatible computer with a hard drive, you can get the 1994 IC MASTER **Alternate Source Directory** on a disk. This disk provides the complete list of alternate sources and allows you to add your own part numbers, as well as notes such as prices or sources. Call Hearst (516) 227-1300 and ask for Book Sales for further information.

Q. I looked in the Alternate Source Directory. The part I want an alternate source for isn't listed. Why not?

A. Are you sure you looked through the entire listing for the original manufacturer? Some devices may be listed in odd ways depending on how the MASTER's editors receive the information. Then there is the probability that no other manufacturer makes an exact replacement for your part. It is important for you to understand how the Alternate Source Directory is compiled. Manufacturers supply the information that **their** part is an exact replacement for **another** part. The original manufacturer does **not** tell us his part can be replaced by those listed.

Q. What do the manufacturers' part numbers mean? I have a Philips NE592N. What do all the letters and numbers mean?

A. Look in Volume Two for the Part Number Guide. Turn to the Philips portion. Now you know the **N** prefix means, zero to plus seventy degrees Centigrade. The **N** suffix indicates the package style. The numbers and letters in the middle are the device type. Each manufacturer has a different code system. Understanding the systems is a great help in comparing devices.

Q. Where can I find the addresses and telephone numbers of manufacturers, local sales offices and distributors?

A. Pick up Volume Three. Turn to the Manufacturers and Distributors Directory. Within each manufacturer, sales offices and distributors are listed alphabetically by state.

Q. I just saw a new device advertised in Electronic Products magazine. It isn't listed in the MASTER. Why not? When will it be listed?

A. Preparing the information for the annual IC MASTER is a tremendous undertaking. It requires the cooperation of every single manufacturer. All of the material must be organized, cross referenced and placed in the data base. This data base must be closed off in November in order to meet the publishing date of late January. That is why some devices are not listed. They came on the market too late for the deadline. There are two updates to the annual MASTER. They are called the **IC MASTER UPDATE**. One is issued in the late Spring and the other in the early Fall. Be sure to sign up for copies when you get your new IC MASTER. If you are not sure whether or not you have requested the updates, please write to the Circulation Department at the address shown on page 2 of this MASTER. Be sure to indicate which edition of the MASTER you are using.

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ABBREVIATIONS OF COMPANY NAMES

Acculin	Acculin, Inc.
Actel	Actel Corporation
AD	Analog Devices
Adaptec	Adaptec
Adv Analog	Advanced Analog
AHA	Advanced Hardware Architectures, Inc.
AdvLinear	Advanced Linear Devices
Altera	Altera Corporation
Analog Micros	Analog Microsystems
Am Arium	American Arium
AMD	Advanced Micro Devices, Inc.
American Micro	American Microsystems, Inc.
Array Micro	Array Microsystems
Analogic	Analogic Corporation
AnalogSys	Analog Systems
AMCC	AMCC (Applied Micro Circuits Corp)
Aptek	Aptek Microsystems
AppMicroSys	Applied Microsystems Corporation
Apex	Apex Microtechnology Corporation
Aspen	Aspen Semiconductor Corp.
Astec Semi	Astec Semiconductor
AutoSys	ASI
Aspec Technlg	Aspec Technology, Inc.
ATMEL	ATMEL Corporation
AT&T	AT&T Microelectronics, 52AL330240
Avasem	Avasem Corporation
Benchmarq	Benchmarq Microelectronics
Brooktree	Brooktree Corporation
Burr-Brown	Burr-Brown Corporation
CustomArrays	Custom Arrays Corp.
Calogic	Calogic Corporation
Catalyst Semi	Catalyst Semiconductor
C&C Tech	C & C Technology Inc.
CE Infosys	CE Infosys of America, Inc.
Cermetek	Cermetek Microelectronics, Inc.
Chips&Tech	Chips and Technologies, Incorporated
Cherry Semi	Cherry Semiconductor Corporation
Cirrus	Cirrus Logic, Inc.
Comlinear	Comlinear Corporation
Catalyst Rsch	Catalyst Research
CMD Micro	California Micro Devices Corporation
Cornes USA	Cornes U.S.A. Ltd.
Crystal	Crystal Semiconductor Corp.

Commodore	Commodore Semiconductor Group
Crosspoint	Crosspoint Solutions, Inc.
ControlData	Control Data
Cybernetic	Cybernetic Micro Systems
Cypress	Cypress Semiconductor Corp.
Dallas	Dallas Semiconductor
Datel	Datel, Inc.
Data Delay	Data Delay Devices, Inc.
Dense-Pac	Dense-Pac Microsystems, Inc.
Dionics	Dionics Inc.
DSP Group	DSP Group, Inc.
Data I/O	Data I/O Corporation
ECI Semi	ECI Semiconductor
EDI	Electronic Designs Inc.
Elantec	Elantec, Inc.
Eletech	Eletech Electronics
Elite Micro	Elite Microelectronics, Inc.
EM Micro	EM Microelectronic-Marin SA
Epson	Epson America Inc.
Ericsson	Ericsson Components
ESS	Electronic Speech Systems, Inc
EXEL	EXEL Microelectronics, Inc.
Exar	Exar Corporation
Fujitsu	Fujitsu Microelectronics, Inc.
Gennum	Gennum Corporation
GET Eng	GET Engineering Corp.
Galil	Galil Motion Control
Genesis Micro	Genesis Microchip Inc.
Goal Electronic	Goal Electronics Inc.
Greenwich	Greenwich Instruments USA
GoldStar	GoldStar Technology, Inc.
Harris	Harris Corporation
Hyundai	Hyundai Electronics America
Headland	Headland
Heurikon	Heurikon Corporation
Hitachi	Hitachi America, Ltd.
HiLevel	Hilevel Technology, Inc.
Hualon Micro	Hualon Microelectronics Corp
Holt	Holt, Integrated Circuits, Inc.

Honeywell	Honeywell
HP	Hewlett-Packard-Logic Systems Division
Hughes	Hughes Aircraft Co.
IBM	International Business Machines Corporation
IC DESIGNS	IC DESIGNS
Vertex	Vertex Semiconductor Corp.
IC Sensors	IC Sensors, Inc.
ICT	International CMOS Technology
IntCirSys	Integrated Circuit Systems, Inc.
Ideal Semi	Ideal Semiconductor
IDT	Integrated Device Technology, Inc.
Int Info Tech	Integrated Information Technology, Inc.
ILC-DDC	ILC Data Device Corp.
ILSI	Integrated Logic Systems Inc.
IMI	International Microcircuits, Inc.
IMP	International Microelectronic Products
IntMeasSys	Integrated Measurement Systems
Intergraph	Intergraph
Intel	Intel Corporation
Interpoint	Interpoint Corporation
GE/Intersil	GE/Intersil
Interface Tech	Interface Technology, Incorporated
Intronics	Intronics, Inc.
ISD	Information Storage Devices,Inc
Isocom	Isocom Incorporated
ISSI	Integrated Silicon Solution Inc.
ITC Microcomps	ITC Microcomponents Inc.
IXYS	IXYS Corporation
Krueger	Krueger Company
SemTech	Semtech Corpus Christi
LogicDev	Logic Devices Inc.
Lansdale	Lansdale Semiconductor, Inc.
LogicAuto	Logic Automation Incorporated
Lin Int Sys	Linear Integrated Systems
LSI Comp	LSI Computer Systems, Inc.
LSI Logic	LSI Logic Corporation
LSTI	Logical Solutions Technology Inc.
LinearTech	Linear Technology Corporation
Linfinity Micro	Linfinity Microelectronics
Lattice	Lattice Semiconductor Corp.
Level One	Level One

Macrochip	Macrochip Research
Microchip	Microchip Technology, Inc.
MicronSemi	Micron Semiconductor, Inc
Micropac	Micropac Industries, Inc.
MicroLinear	Micro Linear
MicroPwr	Micro Power Systems, Inc.
Micro-Rel	Micro-Rel
Mitel	Mitel Semiconductor
MicroNet	Micro Networks Company
Mosaic Semi	Mosaic Semiconductor, Inc.
Micrel	Micrel
Mosel-Vitelic	Mosel-Vitelic
Motorola	Motorola Semiconductor Products
Mitsubishi	Mitsubishi Electronics America, Inc.
MSI/Scorpion	MSI/Scorpion Semiconductor
Music	Music Semiconductors, Inc.
MX-COM	MX-COM, Inc.
Maxim	Maxim Integrated Products
NCM	NCM Corporation
NCR	NCR Corporation
NEC	NEC Electronics Inc.
Newbridge	Newbridge Microsystems
NJR	NJR Corporation
NMB	NMB Technologies
NPC	Nippon Precision Circuits Ltd.
National	National Semiconductor Corporation
Oak Technology	Oak Technology, Inc.
OEI	Optical Electronics Inc.
OKI	OKI Semiconductor, Inc.
OnChip Sys	OnChip Systems, Inc.
Optimum Semi	Optimum Semiconductor
Orion	Orion Instruments, Inc.
Optotek	Optotek Limited
Panasonic	Panasonic Industrial Company/Electronic Components Division
Paradigm	Paradigm Technology, Inc.
Peps	Performance Electronic Packaging Services
Philips	Philips Semiconductors
Phylon Inc.	Phylon Inc.
GEC Plessey	GEC Plessey Semiconductors
Plus Logic	Plus Logic
PLX Tech	PLX Technology, Inc.
PMC	Pacific Microelectronics Centre
PMD	Performance Motion Devices
Power Integ	Power Integrations, Inc.
Proximity	Proximity Technology Inc.
Performance	Performance Semiconductor Corp.

QuickLogic	QuickLogic Corp
Qualcomm	Qualcomm Incorporated
Quality Semi	Quality Semiconductor
Raytheon	Raytheon Company
RCA	RCA
R&E Intl	R&E International, Inc
EG&G-Reticon	EG&G Reticon Corporation
Ricoh	Ricoh Corporation
Ramtron	Ramtron Corporation
Rockwell	Rockwell International
Rochester	Rochester Electronics Incorporated
ROHM	ROHM Corporation
Samsung	Samsung Semiconductor, Inc.
Spancom	Spancom Corporation
Sanyo	Sanyo Semiconductor Corporation
Silicon Conn	Silicon Connections Corp.
Silicom	Silicom Limited
Seiko Instr	Seiko Instruments USA, Inc.
Siemens	Siemens Components, Inc.
SEEQ	SEEQ Technology, Incorporated
Signetics	Signetics Company
SGS-Thomson	SGS-THOMSON Microelectronics, Inc.
Sharp	Sharp Electronics Corporation
Sipex	Sipex Corporation
Sil Composers	Silicon Composers, Inc.
Sierra	Sierra Semiconductor Corporation
Siliconix	Siliconix Inc.
SMC	Standard Microsystems Corporation
S-MOS	S-MOS Systems, Inc.
Simtek	Simtek Corporation
Samsung Microwv	Samsung Microwave Semiconductor, Inc.
Sony	Sony Corporation of America
Solarise	Solarise Enterprises Inc.
Sophia	Sophia Systems and Technology
Solitron	Solitron Devices, Inc.
Allegro Micro	Allegro Micro Systems, Inc.
Signal Proc	Signal Processing Technologies
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Unitrode	Unitrode Integrated Circuits Corp.
Unisys	Unisys Corporation
Universal	Universal Semiconductor Inc.
USAR Systems	USAR Systems, Inc.
UTMC	United Technologies Microelectronics Center
Vadem	Vadem
Vanguard Semi	Vanguard Semiconductor
Vitelic	Vitelic
VTC	VTC Inc.
VLSI Tech	VLSI Technology, Inc.
Vitesse	Vitesse Semiconductor Corp.
WDC	The Western Design Center, Inc.
White Tech	White Technology, Inc.
Waferscale	Waferscale Integration Inc.
Western	Western Digital Corporation
XECOM	XECOM, INC.
Xicor	Xicor, Inc.
Xilinx	Xilinx Corp.
Yamaha	Yamaha Systems Technology
ZAX	Zaxtek
Zilog	Zilog, Inc.
ZyMOS	ZyMOS Inc.

COMPANY ACQUISISTIONS, MERGERS & CHANGES

Former Name	**New Name**
Fairchild Semiconductor	*Now part of* National Semiconductor
Ferranti Interdesign	Custom Arrays Corporation
Gazelle Semiconductor	Triquint Semiconductor *(merged)*
GE, RCA and Intersil	*ICs available from* Harris Corporation
General Instrument Microelectronics Division	Microchip Technology
Gould AMI	American Microsystems Inc.
Harris Microwave Semiconductor	Samsung Microwave Semiconductor
Honeywell Semiconductors	Signal Processing Technologies
Hybrid Systems Corporation	Sipex Corporation *(merged)*
Inova	*No longer in business*
Integrated CMOS Systems	Vertex Semiconductor
Intersil	*See* GE
Lambda Semiconductor	*ICs available from* Semtech Corporation
Monolithic Memories, Inc. (MMI)	*Now part of* Advanced Micro Devices
Mostek Semiconductors	*Now part of* Thomson-CSF
Plus Logic	*Now part of* Xilinx
Precision Monolithics Inc. (PMI)	*Now part of* Analog Devices
RCA	*See* GE
RIFA	Ericsson Components
Scorpion	MSI/Scorpion
Silicon General	Linfinity Microsystems
Sprague Semiconductor	Allegro Microsystems
TRW LSI Products	Raytheon-LaJolla
ZAXTEK	Zax Corp.

MANUFACTURERS AND DISTRIBUTORS/ REPRESENTATIVES DIRECTORY

The Manufacturers and Distributors/Representatives Directory is a comprehensive telephone directory of the entire integrated circuit industry. It places at your fingertips the names and phone numbers you need to know. The directory includes domestic and international sales offices, representatives and distributors; it also tells you where and whom to call to obtain technical and ordering information.

ACCULIN, INC., 214 North Main Street, Suite 204, Natick, Massachusetts 01760, Tel: 508-650-1012, FAX: 508-650-1457

Sales Office & Representatives

Intl	England, Aylesbury, Bucks, Ambar Cascom Ltd	0296-434141

Distributors

Intl	France, Sevres Cedex, Tekelec Airtronics	1-45-34-75-35
Intl	Japan, Toyko, Nippon Imex	3321-8000

ACTEL CORPORATION, 955 E. Arques Ave., Sunnyvale, California 94086, Tel: 408-739-1010, FAX: 408-739-1540

Sales Office & Representatives

AL	BITS, Inc	205-881-2900
AZ	Luscombe Engnr	602-949-9333
CA	Calabasas, Centaur Corp	818-591-1655
CA	Irvine, Centaur Corp	714-261-2123
CA	Roseville, I^2 Inc	916-784-0530
CA	San Diego, Centaur Corp	619-278-4950
CA	Santa Clara, I^{2}Inc	408-988-3400
CA	Sunnyvale, Actel Corp	408-739-1010
CA	Westminster, Actel Corp	714-373-4488
CO	Thom Luke Sls, Inc	303-649-9717
CT	Advanced Tech Sls, Inc	508-664-0888
FL	Ft. Lauderdale, QXI Inc	305-978-0120
FL	Melbourne, QXI, Inc	407-676-1491
FL	Orlando, QXI, Inc	407-872-2321
FL	St. Petersburg, OXI Inc	813-894-4556
GA	BITS, Inc	404-564-5599
GA	Norcross, Actel Corp	404-409-7888
ID	First Source	208-378-4680
IL	Carlson Elctrn Sls Assocs	708-956-8240
IL	Arlington Hghts, Actel Corp	708-259-1501
IN	Bailey's Elctrn Sls & Technlg	317-848-9958
IA	Carlson Elctrn Sls Assocs	319-378-1450
KS	DLE Elctrns	316-683-6400
MD	New Era Sls	410-761-4100
MA	Advanced Tech Sls, Inc	508-644-0888
MA	Boxborough, Actel Corp	508-635-0010
MI	Elctrn Sources, Inc	313-227-3598
MN	Gibb Technlg Sls	612-835-3370
MO	John G. Macke Co	314-432-2830
NJ	Nexus	201-947-0151
NY	Cicero, L-MAR Assocs	315-699-0157
NY	E. Aurora, L-MAR Assocs	716-655-4992
NY	Fairport, L-MAR Assocs	716-425-9100
NY	Marcellus, L-MAR Assocs	315-673-1325
NC	BITS, Inc	919-676-1880
OH	Chagrin Falls, J.R. Thornberry Co	216-247-0060
OH	Columbus, J.R. Thornberry Co	614-487-1882
OR	L^{2}Ltd	503-629-8555
PA	Bridgeville, J.R. Thornberry Co	412-745-8441
PA	Trevose, Omega Elctrn Sls	215-244-4000
TX	Austin, OM Assocs	512-794-9971
TX	Houston, OM Assocs	713-789-4426
TX	Richardson, Actel Corp	214-235-8944
TX	Richardson, OM Assocs	214-690-6746
UT	First Source	801-943-6894
WA	L^{2}Ltd	206-827-8555
WI	Carlson Elctrn Sls Assocs	414-476-2790
Can	Ont., Brampton, Clark-Hurman Assocs	416-840-6066
Can	Ont., Nepean, Clark-Hurman Assocs	613-727-5626
Can	Quebec, Clark-Hurman Assocs	514-426-0453
Intl	France, Paris, Mustronic	1-34-65-9044
Intl	Germany, Neufahrn, Actel GmbH	49-0-8165-61029
Intl	Italy, Milano, ROAN srl	2-38-90-3259
Intl	U.K., Hants, Actel Europe Ltd	44-0-256-29209

Distributors

AL	Huntsville, Pioneer Technlgs	205-837-9300
AZ	Phoenix, Wyle Labs	602-437-2088
CA	Wyle Labs	714-753-9953
CA	Calabasas, Wyle Labs	818-880-9000
CA	Irvine, Wyle Labs	714-753-9953
CA	Rancho Cordova, Wyle Labs	916-638-5282
CA	San Diego, Wyle Labs	619-565-9171
CA	San Jose, Pioneer Technlgs	408-954-9100
CA	Santa Clara, Wyle Labs	408-727-2500
CO	Thornton, Wyle Labs	303-457-9953
CT	Norwalk, Pioneer Standard Elctrns	203-853-1515
FL	Altamonte Springs, Pioneer Technlgs	407-834-9090
FL	Clearwater, Pioneer Technlgs	813-536-0445
FL	Deerfield Bch, Pioneer Technlgs	305-428-8877
GA	Duluth, Pioneer Technlgs	404-623-1003
IL	Addison, Pioneer Standard Elctrns	708-495-9680
IN	Indianapolis, Pioneer Standard Elctrns	317-573-0880
KS	Lenexa, Pioneer Standard Elctrns	913-492-0500
MD	Gaithersburg, Pioneer Technlgs	301-921-0660
MA	Burlington, Wyle Labs	617-272-7300
MA	Lexington, Pioneer Standard Elctrns	617-861-9200
MI	Grand Rapids, Pioneer Standard Elctrns	616-698-1800
MI	Livonia, Pioneer Standard Elctrns	313-525-1800
MN	Eden Prairie, Pioneer Standard Elctrns	612-944-3355
MO	St. Louis, Pioneer Standard Elctrns	314-432-4350
NJ	Fairfield, Pioneer Standard Elctrns	201-575-3510
NY	Binghamton, Pioneer Standard Elctrns	607-722-9300
NY	Fairport, Pioneer Standard Elctrns	716-381-7070
NY	Woodbury, Pioneer Standard Elctrns	516-921-8700
NC	Charlotte, Pioneer Technlgs	704-527-8188
NC	Durham, Pioneer Technlgs	919-544-5400
OH	Dayton, Pioneer Standard Elctrns	513-236-9900
OR	Hillsboro, Wyle Labs	503-640-6000
PA	Horsham, Pioneer Technlgs	215-674-4000
PA	Pittsburgh, Pioneer Standard Elctrns	412-782-2300
TX	Austin, Wyle Labs	512-345-8853
TX	Austin, Pioneer Standard Elctrns	512-835-4000
TX	Dallas, Pioneer Standard Elctrns	214-386-7300
TX	Houston, Wyle Labs	713-879-9953
TX	Houston, Pioneer Standard Elctrns	713-495-4700
TX	Richardson, Wyle Labs	214-235-9953
UT	West Valley City, Wyle Labs	801-974-9953
WA	Redmond, Wyle Labs	206-881-1150
WI	Brookfield, Pioneer Standard Elctrns	414-784-3480
Can	Zentronics	416-507-2600
Intl	Australia, Neutral Bay, NSW, Reptechnic	2-953-9844
Intl	Austria, Wien, Codico, Ges.m.b.H. & Co KG	0222-86-24-28
Intl	Belgium, Zaveniem, Acal Auriema NVSA	02-720-59-83
Intl	Denmark, Herlev, Avnet Nortec A/S	042-84-20-00
Intl	Egypt, Cairo, S.E.E.	2-665-948
Intl	Finland, Helsinki, OY Fintronic AB	9-0-692-6022
Intl	France, Grenoble, SCAIB SA	1-76-90-22-60
Intl	France, Paris, A2M	1-46-23-79-25
Intl	France, Paris, SCAIB SA	1-46-87-23-13
Intl	Germany, Microcomputers Sys Comps	07249-7580
Intl	Germany, Nettetal, REIN Elektronik GmbH	02153-733-0
Intl	Hong Kong, Yau Tong, Twin-Star Trading Co	852-346-9085
Intl	India, Singapore, Benchmark Sys	65-299-1605
Intl	Israel, Herzlia, A.S.T. Ltd	09-583355
Intl	Italy, FANTON Comps S.r.l.	02-489-12963
Intl	Italy, Milan, Lási Elettronica	02-661431
Intl	Japan, Kyoto, Matsushita Elctrns Corp	75-956-9505
Intl	Japan, Yokohama-Shi, Innotech Corp	45-474-9000
Intl	Korea, Seoul, Anam Semicond. Design Co., Ltd	2-553-2997
Intl	Netherlands, Enschede, Transfer B.V.	053-330336
Intl	Norway, Hvalstad, Avnet Nortec A/S	66-84-62-10
Intl	So. Africa, Sandton, ASIC Design Service	11-803-0163
Intl	Spain, Barcelona, Semiconductores S.A.	343-2172340
Intl	Spain, Madrid, Semiconductores S.A.	341-7422313
Intl	Sweden, Solna, Avnet/Nortec AB	0-8-705-18-00
Intl	Switzerland, Brugg, Actel Sulzer	0-32-53-63-75
Intl	Taiwan, Taipei, Aexcel Technlg Corp	2-712-7321
Intl	Turkey, Istanbul, Inter Muhendislik Danismanlik	1349-9400
Intl	U.K., Maidenhead, Manhattan Skyline Ltd.	0628-75851
Intl	U.K., Reading, Microprocessor & Memory Distrib	0734-313232
Intl	U.K., Wokingham, Gothic-Crellon Ltd	0734-788878

ADAPTEC, 691 South Milpitas Blvd., Milpitas, California 95035, Tel: 408-945-8600

Sales Office & Representatives

CA	Milpitas, Sales Office (Northwest Region)	408-945-8600
CA	Tustin, Sales Office (Southwest Region)	714-838-6000
CO	Boulder, Sales Office (Northwest Region)	303-443-0988
FL	St. Petersburg, Sales Office (Southeast Region)	813-823-5060
MA	North Andover, Sales Office (New England Region)	508-686-7274
MN	Minneapolis, Sales Office (Central Region)	612-545-8752
NJ	Freehold, Sales Office (Eastern Region)	201-303-1411
PA	Ft. Washington, Sales Office (Eastern Region)	215-628-9779
TX	Grapevine, Sales Office (Central Region)	817-481-3390
Intl	Belgium, Brussels, Sales Office (Europe)	011-322-675-29-30
Intl	Hong Kong, Sales Office (Far East)	011-852-722-5441
Intl	Singapore, Sales Office (Far East)	011-65-278-5213
Intl	United Kingdom, Basingstoke, Sales Office (Europe)	011-44-256-468-186
Intl	West Germany, Muncih, Sales Office (Europe)	011-49-89-46-50-32

ADVANCED ANALOG, Division of Intech, 2270 Martin Avenue, Santa Clara, California 95050, Tel: 408-988-4930, TWX: 910-338-2213, FAX: 408-988-2702

Sales Office & Representatives

AL	Huntsville, Sides Assoc.	205-859-9395
AZ	Tempe, Thor Engnr	602-438-8494
CA	La Jolla, KSA	619-453-5720
CA	Manhattan Beach, Pacific Edge	213-372-5435
CA	Sunnyvale, Pass Assoc	408-735-9040
FL	Coral Springs, CBC Electrns	305-755-1111
FL	Longwood, CBC Electrns	407-831-5380
FL	Tampa, CBC Electrns	813-969-1901
GA	Lilburn, Adams Electrns	404-925-9115
IL	Berkeley, ESA Tech. Mktg	312-544-0120
IN	Indianapolis, CC Electro	317-921-5000
IA	Cedar Rapids, Delltron	319-393-0075
KS	Wichita, Acorn	913-649-6402
MI	Madison Heights, Pine Sales	313-589-0350
MO	St. Louis, Acorn Electrns	314-421-1751
NH	Nashua, Bell Controls	603-882-6984
NY	Huntington, Compar, New York	516-423-5660
NC	Sanford, Adams Electrns	919-774-8816
OH	Monrow Falls, Summit Sales	216-686-7821
OR	Beaverton, Micro Sales	503-645-2841
TX	Dallas, Converter Electrns	214-333-2028
UT	Ogden, Taylor Mktng.	801-546-9570
VA	Sterling, Beacon North	703-478-2480
WA	Bellevue, Micro Sales	206-451-0568
Can	Alberta, Calgary, Kaytronics	403-275-7000
Can	British Columbia, Burnaby, Kaytronics	604-294-2000
Can	Ontario, Concord, Kaytronics	416-669-2262
Can	Ontario, Kanata, Kaytronics	613-564-0080
Can	Quebec, Ville St. Laurent, Kaytronics	514-745-5000

ADVANCED HARDWARE ARCHITECTURES, INC., P.O. Box 9669, Moscow, Idaho 83843, Tel: 208-883-8000, FAX: 208-883-8001

Sales Office & Representatives

AL	Huntsville, Geisting & Assocs	205-830-4554
AZ	Tempe, Engnr Solutions	602-820-6711

CA	Aliso Viejo, Pro Assocs., South	714-588-2700
CA	Milpitas, Advanced Technlg Sales	408-946-4111
CA	San Diego, KSA, Inc	619-453-5720
CO	Wheatridge, Waugaman Assocs	303-423-1020
FL	Altamonte Springs, VG Sales	407-831-8688
FL	Ft. Lauderdale, VG Sales	305-938-4333
FL	Largo, VG Sales	813-536-7787
GA	Duluth, Giesting & Assocs	404-476-0025
ID	Moscow, AHA	208-883-8000
IL	Elk Grove Village, Oasis Sales Corp	708-640-1850
IN	Carmel, Giesting & Assocs	317-844-5222
IA	Cedar Rapids, Oasis Sales Corp	319-377-8738
KY	Versailles, Giesting & Assocs	606-873-2330
MD	Westminster, Walker Assocs	410-876-9399
MA	Waltham, Datcom	617-891-4600
MI	Livonia, Giesting & Assocs	313-478-8106
MN	Bloomington, Oasis Sales Corp	612-941-1917
NJ	Cherry Hill, Wyck Mktg	609-727-1070
NY	Elmont, Crane & Egert	516-872-0800
NY	Syracuse, Advanced Comps	315-437-6700
OH	Cincinnati, Giesting & Assocs	513-385-1105
OR	Beaverton, Western Tech Sales	503-644-8860
PA	Pittsburgh, Giesting & Assocs	412-828-3553
TX	Richardson, Logic 1	214-234-0765
UT	Salt Lake City, Waugaman Assocs	801-261-0802
WA	Bellevue, Western Tech Sales	206-641-3900
WA	Spokane, Western Tech Sales	509-922-7600
WI	Brookfield, Oasis Sales Corp	414-782-6660
PR	Mayaguex, VG Sales	809-831-4050

ADVANCED LINEAR DEVICES, 1180 F Miraloma Way, Sunnyvale, California 94086, Tel: 408-720-8737, FAX: 408-720-8297

ADVANCED MICRO DEVICES, INC., 901 Thompson Place, Sunnyvale, California 94088, Tel: 408-732-2400, TELEX: 34-6306

Sales Office & Representatives

AL	AMD Sales Office	205-882-9122
AZ	AMD Sales Office	602-242-4400
CA	Culver City, AMD Sales Office	310-645-1524
CA	Newport Beach, AMD Sales Office	714-752-6262
CA	Sacramento, AMD Sales Office	916-786-6700
CA	San Diego, AMD Sales Office	619-560-7030
CA	San Jose, AMD Sales Office	408-922-0300
CA	Woodland Hills, AMD Sales Office	818-878-9988
CO	AMD Sales Office	303-741-2900
CT	AMD Sales Office	203-264-7800
FL	Boca Raton, AMD Sales Office	407-361-0050
FL	Clearwater, AMD Sales Office	813-530-9971
FL	Orlando, AMD Sales Office	407-862-9292
GA	AMD Sales Office	404-449-7920
ID	AMD Sales Office	208-377-0393
IL	Chicago(Itasca), AMD Sales Office	708-773-4422
IL	Naperville, AMD Sales Office	708-505-9517
IL	Skokie, Indl Reps Inc	708-967-8430
IA	Lorenz Sales	319-377-4666
KS	Merriam, Lorenz Sales	913-469-1312
KS	Wichita, Lorenz Sales	316-721-0500
MD	AMD Sales Office	301-381-3790
MA	AMD Sales Office	617-273-3970
MI	Brighton, Com-Tek Sales, Inc.	313-227-0007
MI	Holland, Com-Tek Sales, Inc.	616-335-8418
MN	AMD Sales Office	612-938-0001
MN	Mel Foster Tech. Sales, Inc.	612-941-9790
MO	Lorenz Sales	314-997-4558
NE	LORENZ SALES	402-475-4660
NJ	Cherry Hill, AMD Sales Office	609-662-2900
NJ	Parsippany, AMD Sales Office	201-299-0002
NM	Thorson Desert States	505-883-4343
NY	Brewster, AMD Sales Office	914-279-8323
NY	East Syracuse, Nycom, Inc.	315-437-8343
NY	Hauppauge, Comp Consits, Inc	516-273-5050
NY	Rochester, AMD Sales Office	716-425-8050
NC	Charlotte, AMD Sales Office	704-875-3091
NC	Raleigh, AMD Sales Office	919-878-8111
OH	Centerville, Dolfuss Root & Co.	513-433-6776
OH	Columbus, AMD Sales Office	614-891-6455
OH	Columbus, Dolfuss Root & Co	614-885-4844
OH	Dayton, AMD Sales Office	513-439-0268
OH	Westlake, Dolfuss Root & Co	216-899-9370
OR	AMD Sales Office	503-245-0080
PA	AMD Sales Office	215-398-8006
PA	Russell F. Clark Co., Inc.	412-242-9500
TX	Austin, AMD Sales Office	512-346-7830
TX	Dallas, AMD Sales Office	214-934-9099
TX	Houston, AMD Sales Office	713-376-8084
UT	Front Range Mktg	801-288-2500
WA	Electra Tech. Sales	206-821-7442
WI	Brookfield, Indl Reps, Inc	414-574-9393
Can	B.C., Burnaby, Davetek Mktg.	604-430-3680
Can	Ontario, Kanada, AMD Sales Office	613-592-0060
Can	Ontario, Kanata, Vitel Electrns	613-592-0060
Can	Ontario, Mississauga, Vitel Electrns	416-564-9720
Can	Ontario, Willowdale, AMD Sales Office	416-222-7800
Can	Quebec, Lachine, Vitel Electrns	514-636-5951
Intl	Belgium, Antwerpen, AMD Sales Office	03-248-43-00
Intl	France, Paris, AMD Sls Off	1-49-75-10-10
Intl	Ft. Lauderdale, AMD Sales Office	305-484-8600
Intl	Germany, Bad Homburg, AMD Sales Office	06172-24061
Intl	Germany, Munchen, AMD Sales Office	089-45053-0
Intl	Hong Kong,Wanchai, AMD Sales Office	852-865-4525
Intl	Italy, Milano, AMD Sales Office	02-3390541
Intl	Japan, Atsugi, AMD Sales Office	0462-29-8460
Intl	Japan, Kanagawa, AMD Sales Office	0462-47-2911
Intl	Japan, Osaka, AMD Sales Office	06-243-3250
Intl	Japan, Tokyo, AMD Sales Office	03-3346-7550
Intl	Korea, Seoul, AMD Sales Office	82-2-784-0030
Intl	Singapore, AMD Sales Office	65-3481188
Intl	Sweden, Stockholm, AMD Sales Office	08-98-61-80
Intl	Taiwan, Taipei, AMD Sales Office	886-2-7153536
Intl	UK, London, AMD Sales Office	0483-740440
Intl	UK, Manchester, AMD Sales Office	0925-830380
PR	Comp Rep Assoc, Inc.	809-746-6550

Distributors

AL	Huntsville, Arrow/Schweber Electrns	205-837-6955
AL	Huntsville, Hamilton/Hallmark Electrns	205-837-7210
AL	Huntsville, Wyle Labs/EMG	205-830-1119
AZ	Phoenix, Wyle Labs/EMG	602-437-2088
AZ	Tempe, Anthem Electrns	602-966-6600
AZ	Tempe, Arrow/Schweber Electrns	602-431-0030
AZ	Tempe, Hamilton/Hallmark Electrns	602-902-4500
CA	Calabasas, Arrow/Schweber Electrns	818-880-9686
CA	Calabasas, Wyle Labs/EMG	818-880-9000
CA	Chatsworth, Anthem Electrns	818-700-1000
CA	Costa Mesa, Hamilton/Hallmark Electrns	714-641-4100
CA	Culver City, Hamilton Electro Sales	310-558-2000
CA	El Segundo, Wyle Labs/EMG	310-322-1763
CA	Fremont, Arrow/Schweber Electrns	510-440-2680
CA	Irvine, Anthem Electrns	714-768-4444
CA	Irvine, Arrow/Schweber Electrns	714-587-0404
CA	Irvine, Wyle Labs/EMG	714-753-9953
CA	Irvine, Wyle Labs/EMG	714-863-9953
CA	Rancho Cordova, Wyle Labs/EMG	916-638-5282
CA	Rocklin, Anthem Electrns	916-624-9744
CA	Roseville, Hamilton/Hallmark Electrns	916-925-2216
CA	San Diego, Anthem Electrns	619-453-4871
CA	San Diego, Arrow/Schweber Electrns	619-565-4800
CA	San Diego, Hamilton/Hallmark Electrns	619-571-1900
CA	San Diego, Wyle Labs/EMG	619-565-9171
CA	San Jose, Anthem Electrns	408-453-1200
CA	San Jose, Arrow/Schweber Electrns	408-441-9700
CA	San Jose, Zeus Comps, Inc	408-629-4689
CA	Santa Clara, Wyle Labs/EMG	408-727-2500
CA	Sunnyvale, Hamilton/Hallmark Electrns	408-743-3300
CA	Torrance, Arrow/Schweber Electrns	213-320-8090
CA	Yorba Linda, Zeus Comps, Inc	714-921-9000
CA	Woodland Hills, Hamilton/Hallmark Electrns	818-594-0404
CO	Aurora, Arrow/Schweber Electrns	303-373-5616
CO	Englewood, Anthem Electrns	303-790-4500
CO	Englewood, Arrow/Schweber Electrns	303-799-0258
CO	Englewood, Hamilton/Hallmark Electrns	303-799-0663
CO	Thornton, Wyle Labs/EMG	303-457-9953
CT	Danbury, Hamilton/Hallmark Electrns	203-743-6077
CT	Wallingford, Arrow/Schweber Electrns	203-265-7741
CT	Waterbury, Anthem Electrns	203-596-3201
FL	Clearwater, Hamilton/Hallmark Electrns	813-530-0644
FL	Clearwater, Wyle Labs/EMG	813-530-3400
FL	Deerfield Beach, Arrow/Schweber Electrns	305-429-8200
FL	Ft. Lauderdale, Hamilton/Hallmark Electrns	305-767-6377
FL	Lake Mary, Arrow/Schweber Electrns	407-333-9300
FL	Lake Mary, Zeus Comps, Inc	407-333-3055
FL	Winter Park, Hamilton/Hallmark Electrns	407-657-3300
GA	Duluth, Arrow/Schweber Electrns	404-497-1300
GA	Duluth, Hamilton/Hallmark Electrns	404-446-0611
GA	Duluth, Wyle Labs/EMG	404-418-0380
IL	Bensenville, Hamilton/Hallmark Electrns	708-860-7700
IL	Chicago, Newark Electrns	312-784-5100
IL	Itasca, Arrow/Schweber Electrns	708-250-0500
IL	Schaumburg, Anthem Electrns	708-884-0200
IL	Schaumburg, Wyle Labs/EMG	708-303-1040
IN	Carmel, Hamilton/Hallmark Electrns	317-844-9333
IN	Indianapolis, Arrow/Schweber Electrns	317-299-2071
IA	Cedar Rapids, Arrow/Schweber Electrns	319-395-7230
IA	Cedar Rapids, Hamilton/Hallmark Electrns	319-362-4757
KS	Lenexa, Arrow/Schweber Electrns	913-541-9542
KS	Overland Park, Hamilton/Hallmark Electrns	913-344-6044
KY	Lexington, Hamilton/Hallmark Electrns	606-259-1475
MD	Columbia, Anthem Electrns	301-995-6640
MD	Columbia, Arrow/Schweber Electrns	301-596-7800
MD	Columbia, Hamilton/Hallmark Electrns	301-995-3500
MD	Columbia, Wyle Labs/EMG	301-490-2170
MA	Burlington, Wyle Labs/EMG	617-272-7300
MA	Peabody, Hamilton/Hallmark Electrns	508-531-7430
MA	Wilmington, Anthem Electrns	508-657-5170
MA	Wilmington, Arrow/Schweber Electrns	508-658-0900
MA	Wilmington, Zeus Comps, Inc.	508-658-4776
MI	Grandville, Hamilton/Hallmark Electrns	616-243-8805
MI	Livonia, Arrow/Schweber Electrns	313-462-2290
MI	Novi, Hamilton/Hallmark Electrns	313-347-4270
MN	Eden Prairie, Anthem Electrns	612-944-5454
MN	Eden Prairie, Arrow/Schweber Electrns	612-941-5280
MN	Minneapolis, Wyle Labs/EMG	612-921-5910
MN	Minnetonka, Hamilton/Hallmark Electrns	612-932-0600
MO	Chesterfield, Hamilton/Hallmark Electrns	314-537-1600
MO	St. Louis, Arrow/Schweber Electrns	314-567-6888
NJ	Cherry Hill, Hamilton/Hallmark Electrns	609-424-0100
NJ	Fairfield, Hamilton/Hallmark Electrns	201-575-3390
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NJ	Marlton, Wyle Labs/EMG	609-985-7953
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NJ	Pine Brook, Arrow/Schweber Electrns	201-227-7880
NM	Albuquerque, Electrn Devices, Inc	505-822-1300
NM	Albuquerque, Hamilton/Hallmark Electrns	505-828-1058
NY	Commack, Anthem Electrns	516-864-6600
NY	Hauppauge, Arrow/Schweber Electrns	516-231-1000
NY	Hauppauge, Hamilton/Hallmark Electrns	800-332-8638

NY	Melville, Arrow/Schweber Electrns	516-694-6800
NY	Port Chester, Zeus Comps, Inc	914-937-7400
NY	Rochester, Arrow/Schweber Electrns	716-427-0300
NY	Rochester, Hamilton/Hallmark Electrns	716-292-0730
NY	Syracuse, Hamilton/Hallmark Electrns	315-437-2641
NC	Charlotte, Hamilton/Hallmark Electrns	704-527-2485
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NC	Raleigh, Hamilton/Hallmark Electrns	919-878-0810
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OH	Dayton, Hamilton/Hallmark Electrns	513-439-6700
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OH	Solon, Arrow/Schweber Electrns	216-248-3990
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OR	Beaverton, Wyle Labs/EMG	503-643-7900
PA	Horsham, Anthem Electrns	215-443-5150
PA	Pittsburgh, Arrow/Schweber Electrns	412-963-6807
PA	Pittsburgh, Hamilton/Hallmark Electrns	412-281-4150
TX	Austin, Arrow/Schweber Electrns	512-835-4180
TX	Austin, Hamilton/Hallmark Electrns	512-837-8911
TX	Austin, Wyle Labs/EMG	512-345-8853
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TX	Carrollton, Zeus Comps, Inc	214-380-4330
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TX	Houston, Arrow/Schweber Electrns	713-530-4700
TX	Houston, Hamilton/Hallmark Electrns	713-861-8517
TX	Houston, Wyle Labs/EMG	713-879-9953
TX	Richardson, Anthem Electrns	214-238-7100
TX	Richardson, Wyle Labs/EMG	214-235-9953
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UT	Salt Lake City, Arrow/Schweber Electrns	801-973-6913
UT	Salt Lake City, Hamilton/Hallmark Electrns	801-972-2800
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WA	Bellevue, Almac/Arrow Electrns	206-643-9992
WA	Bothell, Anthem Electrns	206-483-1700
WA	Redmond, Hamilton/Hallmark Electrns	206-241-8555
WA	Redmond, Wyle Labs/EMG	206-881-1150
WI	Brookfield, Arrow/Schweber Electrns	414-792-0150
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WI	Waukesha, Wyle Labs/EMG	414-521-9333
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Intl	Finland, Helsinki, Field Oy	90-777-571
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Intl	France, Blagnac, Scaib	61-71-90-83
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Intl	Germany, Nurnberg, Spoerle Electronik KG	0911-521560
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Intl	Italy, Firenze, EBV Elektronik	55-350792
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AEG CORPORATION-TELEFUNKEN

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Intl	Taiwan, Taipei, Beechwood Intl Taiwan Co	886-2-763-5818
Intl	Turkey, Istanbul, Kapman Komandit	90-1-255-5277
Intl	U.K. Bolton, HB Elctrns HB/Addon	44-204-386361
Intl	U.K. Coalville, Flint Distrib Ltd	44-503-510333
Intl	United Kingdom, Bucks, Ambar Cascom Ltd	44-296-434141
PR	Caroline, Electrn Sales Assoc.	809-762-6459

Distributors

CT	Falcon Elctrns	203-878-5272
IL	Newark Elctrns	312-784-3670
MA	Marshall Inds	508-658-0810
MA	Sterling Elctrns	617-938-6200
NY	Arrow Elctrns	516-391-1300
NY	Nu Horizons	516-226-6000
Can	Future Elctrns	514-694-7710

ALTERA CORPORATION

2610 Orchard Parkway, San Jose, California 95134-2020, Tel: 408-894-7000, TELEX: 888496, FAX: 408-433-3943

Sales Office & Representatives

AL	Huntsville, EnVision, Inc.	205-721-1788
AZ	Phoenix, Oasis Sls Inc	602-277-2714
CA	Auburn, Sierra Tech Sls	916-268-3357
CA	Carlsbad, Addem	619-729-9216
CA	Irvine, Altera Corp.	714-587-3002
CA	Newport Beach, Infinity Sls	714-833-0300
CA	San Jose, Altera Corp	408-894-7900
CO	Englewood, Compass Mktg & Sls	303-721-9663
CT	Wallingford, Technology Sales, Inc.	203-269-8853

DC	Columbia, Robert Electrn Sales	410-995-1900
FL	Maitland, EIR, Inc.	407-660-9600
GA	Norcross, EnVision, Inc.	404-840-1055
GA	Roswell, Altera Corp.	404-594-7621
IL	Elk Grove Village, Oasis Sales Corp.	708-640-1850
IL	Schaumburg, Altera Corp.	708-240-0313
IN	Ft. Wayne, Electro Reps	219-489-8205
IN	Indianapolis, Electro Reps, Inc.	317-842-7202
IA	Marion, AEM, Inc.	319-377-1129
KS	Lenexa, AEM, Inc.	913-888-0022
MD	Columbia, Robert Electrn Sales	410-995-1900
MA	Waltham, Technology Sales, Inc.	617-890-5700
MA	Westford, Altera Corp.	508-392-1100
MI	Farmington Hills, Rathsburg Assoc., Inc.	313-489-1500
MN	St. Paul, Cahill, Schmitz & Cahill, Inc.	612-646-7217
MO	Bridgeton, AEM, Inc.	314-298-9900
NJ	Bridgewater, Altera Corp.	908-526-9400
NJ	Marlton, BGR Assoc.	609-983-1020
NM	Albuquerque, Nelco Electronix	505-293-1399
NY	Commack, ERA, Inc.	516-543-0510
NY	Fairport, Technology Sales, Inc.	716-223-7500
NY	Ithaca, Technology Sales, Inc.	607-257-7070
NC	Raleigh, EnVision, Inc.	919-231-9939
OH	Dayton, The Lyons Corp.	513-278-0714
OH	Richfield, The Lyons Corp.	216-659-9224
OH	Westerville, The Lyons Corp.	614-895-1447
OR	Portland, Phase II Tech Sales	503-643-6455
TX	Austin, Tech Mktg, Inc.	512-343-6976
TX	Carrollton, Tech Mktg, Inc.	214-387-3601
TX	Dallas, Altera Corp.	214-701-2330
TX	Houston, Tech Mktg, Inc.	713-783-4497
UT	Salt Lake City, Compass Mktg & Sls	801-322-0391
WA	Bellevue, Phase II, Tech Sales	206-828-8182
WI	Brookfield, Oasis Sales Corp.	414-782-6660
Can	British Columbia, Burnaby, Kaytronics	604-294-2000
Can	Ont., Mississauga, Kaytronics	416-612-9200
Can	Ontario, Calgary, Kaytronics	403-275-7000
Can	Ontario, Mississauga, Kaytronics	416-507-6400
Can	Quebec, Ville St. Laurent, Kaytronics	514-745-5800
Intl	England, Buckinghamshire, Altera UK	44-628-488800, 44-628-488811
Intl	France, Sevres, Altera France	33-1-69-85-5630
Intl	Germany, Eching, Altera GmbH	49-89-3196014
Intl	Italy, Torino, Altera Italia	39-11-223-8588
Intl	Japan, Tokyo, Altera Japan K.K.	81-03-3716-2241

Distributors

Intl	Argentina, Buenos Aires, YEL S.R.L.	54-1-372-7140
Intl	Australia, Burwood, Victoria, Veltek	61-3-808-7511
Intl	Austria, Wien, Hitronik	43-1-601290
Intl	Belgium, Antwerpen, D & D Electrns	32-3-8277934
Intl	Brazil, Sao Paulo, Uniao Digital COM E REP	55-11 536-4121
Intl	China, Beijing, CIDC	86-1-467-7381
Intl	Denmark, Koebenhavn, E.V. Johanssen Electronik A/S	45-31-83-90-22
Intl	England, Aylesbury, Bucks, Ambar Cascom Ltd.	44-296-434141
Intl	England, Thame, Oxfordshire, Thame Comps Ltd.	44-844-261188
Intl	Finland, Espoo, Yleiselektroniikka Oy	358-0-452-621
Intl	France, Sevres, Tekelec Airtronic SA	33-1-46-232425
Intl	Germany, Muenchen, Electrn 2000	49-89-45110-01
Intl	Hong Kong, Kowloon, Eastele	852-798-8860
Intl	India, Jayanagar, Bangalore, Sritech Info Technlg Ltd	91-80-640-661
Intl	Israel, Herzlia B, Vectronics Ltd.	972-9-556-070
Intl	Italy, Milano, Lasi Elettronica S.p.A	39-2-661431
Intl	Japan, Tokyo, Paltek Corp.	81-45 9101381
Intl	Japan, Yokohama City, Altima Corp	81-45-939-6113
Intl	Korea, Seoul, MJL Korea, Ltd.	82-2-784-8000
Intl	Netherlands, Delft, Koning en Hartman	31-15-609906
Intl	Norway, Oslo, Eltron A/S	47-22-500650
Intl	Singapore, Serial Sys Mktg	65-280-0200
Intl	Spain, Madrid, Selco	34-1-359 4346
Intl	Sweden, Solna, Nortec Elektronic AB.	46-8-705-1800
Intl	Switzerland, Wettingen, Eljapex	41-56-275-777
Intl	Taiwan, Taipei, Galaxy Far East Corp.	886-2-7057266
Intl	Taiwan, Taipei, Jeritron Ltd	886-2-585-1636
Intl	Thailand, Bangkok, Nu-Era Co Ltd	66-2-318-6453

AMERICAN ARIUM, 14281 Chambers Road, Tustin, California 92680, Tel: 714-731-1661, FAX: 714-731-6344

Sales Office & Representatives

AZ	Tempe, Hannah-Hill	602-431-1771
CA	Orange County, Access Technologies	714-496-3318
CA	Placentia, Access Technologies	714-996-3917
CA	San Diego, Access Technologies	619-530-1911
CA	San Mateo, Scamp Design Co.	415-573-0501
CA	Santa Clara, Manco	408-496-6611
CA	Tustin, American Automation	714-731-1661
CO	Broomfield, Hannah-Hill	303-465-5027
CT	Bethany, Tri-Logic Assocs.	203-777-9001
IL	Arlington Heights, Comtel Midwest	708-392-4040
IN	Indianapolis, Comtel Midwest	317-253-1681
KS	Shawnee Mission, Comtel Midwest	913-268-0762
MD	Columbia, Analyzers Only	301-995-6322
MA	West Boylston, Design Automation Sales	508-835-2473
MA	Wilmington, Tri-Logic Assocs.	508-658-3800
MI	Southfield, Comtel Instrs	313-358-2505
MN	Rosemont, Nytram Corp.	612-437-1964
MO	Manchester, Comtel Midwest	314-227-7220
NJ	Newark, Rical Assocs.	201-643-0880
NM	Albuquerque, R and R Tech. Sls.	505-821-0222
NM	Albuquerque, Hannah-Hill	505-268-0950
OH	Columbus, Comtel Instrs	614-876-8305
OH	Dayton, Comtel Instrs	513-426-5310
OH	Highlands Heights, Comtel Instrs	216-442-8080
OR	Wilsonville, Syntek	503-682-2750
PA	Huntington Valley, Scientific Reps	215-322-6500
PA	Pittsburgh, Comtel Instrs	412-922-5720
TX	Richardson, J. Wisdom & Assocs., Inc.	214-470-9093
UT	Salt Lake City, Hannah-Hill	801-364-0606
WA	Bellevue, Syntek	206-462-7700
WI	New Berlin, Comtel Midwest	414-544-6042
Can	British Columbia, Vancouver, Jerome & Francis Co. Ltd.	1-604-986-1286
Can	Ontario, Scarborough, Mutitest Electrns	1-416-609-9396
Intl	Argentina, Buenos Aires, Jeren	011-54-1-804-0985
Intl	Australia, Clayton, Victoria, Kenelec Pty Ltd.	011-61-3-560-1011
Intl	Austria, Wien, Rekirsch Electronische	43-222-253626
Intl	Belguim, Peuti, Simac Electrns	32-2-2523690
Intl	Brazil, Sao Paulo, Sistronics	011-55-11-247-5588
Intl	Denmark, Naerum, Metric A/S	45-2-804200
Intl	England, Hertfordshire, Kontron Electrns	0923-245991
Intl	Finland, Vantaa, Labtronic Oy	358-0-847-144
Intl	France, Villacoublay, Kontron Electrns	39469722
Intl	Germany, Munich, Software Technik	896127087
Intl	Hong Kong, Wachai, Universal Instrs	011852-5-833-5188
Intl	Korea, Seoul, Elcom	555-5222, 555-5223
Intl	New Zealand, Aukland, GTS Engnr	011-64-9-54-6745
Intl	Singapore, Silicon Instrumentation	011-65-250-8336
Intl	Spain, Deirio-Vizcaya, Novatronic S.A.	34-4-452-0811
Intl	Spain, Madrid, Novatronic S. A.	34-1-534-7388
Intl	Sweden,Wein, Ferner Electrns AB	46-2-804200
Intl	Switzerland, Zurich, Kontron Electrns	FAX 411621118
Intl	Taiwan, Taipei, R.O.C., Topward Elec. Inst. Co.	011-886-2-601-8801
Intl	United Kingdom, Basingstoke, ARS Microsystems	44-0256-381687

Distributors

Intl	Argentina, Buenos Aires, Reycom Electonica S.R.L.	701-4462
Intl	Australia, Clayton, Victoria, Kenelec Pty. Ltd.	61-35-60-10-11
Intl	Belgium, Brussels, DETRON	32-2-4242506
Intl	Denmark, Horsens, Instrutek A/S	FAX: 45-5-615658
Intl	France, Wissous, Fountaine Electronique	33-1-69-30-80-50
Intl	Germany, Martinaried, Allmos Electrn GmbH	49-89-857-0000
Intl	India, Adyar, Madras, Indchem Electrns Ltd.	91-44-418387
Intl	Indonesia, Hariff	62-22-7-1880
Intl	Italy, Milano, Medea (Italy HQ)	39-2-4454744
Intl	Italy, Milano, Kontron Electrns	39-2-50721
Intl	Italy, Roma, Medea	39-6-8889-758
Intl	Korea, Seoul, Myoung Corp.	82-784-9942
Intl	Netherlands, Veldhoven, Simac Electrns	040-582911
Intl	South Africa, Sandton, Specitec (Pty) Ltd.	2711-789-1743
Intl	Spain, Madrid, Kontron Instrs	34-1-358-1815
Intl	Switzerland, Kontron Electronik AG	411-736-4111
Intl	Switzerland, Zurich, Traco Electronik AG	41-1-2010711
Intl	Taiwan, Taipei, R.O.C., Time Wave International Corp.	886-2-7368-150
Intl	United Kingdom, American Arium UK	44-993-778991

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NY (516) 226-6000
CT (203) 265-0162
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MA (617) 246-4442
No.NY (716) 292-0777
MD (410) 995-6330
PA (609) 231-0900
OH (216) 349-2008
FL (305) 735-2555
No.Fl (407) 831-8008
GA (404) 416-8666
AL (205) 722-9330
INT'L (201) 882-4260
AMI® SEMICONDUCTORS
American Microsystems, Inc.

AMERICAN MICROSYSTEMS, INC., 2300 Buckskin Road, Pocatello, Idaho 83201, Tel: 208-233-4690, FAX: 208-234-6795

Sales Office & Representatives

AL	Huntsville, Southeast Tech. Grp.	205-534-2376
AL	Huntsville, Sales Office	204-837-8486
AZ	Scottsdale, Thom Luke Sls.	602-941-1901
CA	San Jose, Sales Office	408-452-8550
CA	Santa Ana, Jones & Mc Geoy Sales, Inc.	714-547-6466
CA	Santa Clara, I2 Inc.	408-988-3400
CA	Tustin, Sales Office	714-573-8199
CO	Denver, Elcom, Inc.	303-337-2300
CT	Hamden, Datcom	203-288-7005
FL	Altamonte Springs, Kinetic Sls.	407-339-3855
FL	Altamonte Springs , Sales Office	407-830-8889
FL	Deerfield Beach, Sales Office	305-425-0212
GA	Lawrenceville, Southeast Tech. Grp.	404-979-2055
IL	Elk Grove Village, Control Sales	414-797-9500
IN	Ft.Wayne, Sales Office	219-489-4992
IN	Indianapolis, Electro Reps, Inc.	317-842-7202
IN	Kokomo, Sales Office	317-452-5151
IA	Cedar Rapids, R. F. Welch Co.	319-362-6824
KS	Lenexa, Midtec Assoc. Inc.	913-384-0840
MD	Towson, Advanced Technology Sales, Inc.	301-296-9360
MA	Lexington, Sales Office	617-861-6530
MA	Waltham, Datcom	617-891-4600
MI	Farmington Hills, J.L. Montgomery	313-489-0099
MN	Edina, Sales Office	612-893-1214
MN	Roseville, Vector	612-631-1334
MS	Meridan, Southeast Tech. Grp.	601-485-7055
MO	St.Louis, Midtec	314-275-8666
NJ	Montvale, Sales Office	201-930-1350
NJ	Mount Laurel, S.J. Assoc.	609-866-1234
NY	Melville, Sales Office	516-293-8358
NY	Rockville Center, SJ Assoc	516-536-4242
NY	Syracuse, T-Squared Elec.	315-463-8592
NY	Victor, T-Squared Elec.	716-924-9101
NC	Raleigh, Sales Office	919-847-9468
NC	Zebulon, Southeast Tech. Sls.	919-269-5589
OH	Akron, Privett	216-745-8890
OH	Cincinnati, Privett	513-825-0022
OR	Beaverton, Micro Sales	503-645-2841
TX	Austin, The Thorson Co.	512-345-1985
TX	Dallas, The Thorson Co.	214-233-5744
TX	Houston, The Thorson Co.	713-558-8205
TX	Richardson, Sales Office	214-231-5721
UT	Murray, Elcom	801-262-2472
VA	Richmond, Advanced Tech. Sls.	804-320-8756
WA	Bellevue, Micro Sales	206-451-0568
WA	Redmond, Sales Office	206-869-6236
WI	Brookfield, Control Sales	414-797-9500
Can	Ontario, Nepean, Sales Office	613-726-1570
Can	Quebec, Lachine, Vitel Electrns	514-636-5951

Intl	East San Jose, CA, Sales Office	408-452-8592
PR	San Juan, Electrn Tech. Sales,Inc.	809-798-1300

Distributors

AL	Huntsville, Future Elec.	205-830-2322
AZ	Phoenix, Future	602-968-7140
CA	Chatsworth, Future	818-772-6240
CA	Irvine, Future	714-250-4141
CA	San Diego, Future	619-278-5020
CA	San Jose, Future	408-434-1122
CO	Westminster, Future	303-421-0123
CT	Bethel, Future	203-743-9594
FL	Altamonte Springs, Future	407-767-8414
FL	Clearwater, Future	813-530-1222
FL	Ft. Lauderdale, Nu Horizons	305-735-2555
GA	Norcross, Future	404-441-7676
IL	Schaumbert, Future	708-882-1255
MA	Wakefield, Nu Horizons	617-246-4442
MA	Westborough, Future	508-779-3000
MI	Detroit, CAM RPC	313-261-9555
MI	Livonia, Future	313-261-5270
MN	Eden Prairie, Future	612-944-2200
MN	St. Louis, Future	612-944-2200
NJ	Marlton, Nu Horizons	716-248-5980
NJ	Marlton, Future	609-778-7600
NJ	Parsippany, Future	201-299-0400
NJ	Pinebrook, Nu Horizons	201-882-8300
NY	E. Rochester, Nu Horizons	716-248-5980
NY	Hauppauge, Future	516-234-4000
NY	Liverpool, Future	315-451-2371
NY	N. Amityville, Nu Horizons	516-226-6000
NY	Rochester, CAM RPC	716-427-9999
NY	Rochester, Future	716-272-1120
NC	Charlotte, Future	704-529-5500
NC	Raleigh, Future	919-790-7111
OH	Cincinnati, CAM RPC	513-771-6666
OH	Cleveland, CAM RPC	216-461-4700
OH	Columbus, CAM RPC	614-888-7777
OH	Dayton, CAM RPC	513-898-1111
OH	Mayfield Hts., Future	216-449-6996
OR	Beaverton, Future	503-645-9454
PA	Pittsburgh, CAM RPC	412-963-6202
TX	Austin, LCD	512-388-0700
TX	Carrollton, LCD	214-245-0600
TX	Houston, Future	713-556-8696
TX	Richmond, Future	214-437-2437
UT	Salt Lake City, Future	801-972-8489
WA	Redmond, Future	206-881-8199
WI	Waukesha, Future	414-786-1884
Can	Calgary, Alberta, Future Elctrns.	403-250-5550
Can	Ontario, Downsview, Future	416-638-4771

ANALOG DEVICES

FAX: 617-326-8703

ANALOG DEVICES, One Technology Way, PO Box 9106, Norwood, Massachusetts 02062-9106, Tel: 617-329-4700, TELEX: 924491, TWX: 710-394-6577, FAX: 617-326-8703

Sales Office & Representatives

AL	Analog Devices, Inc	205-534-0044
AL	Huntsville, Currie, Peak & Frazier	205-536-1506
AZ	Analog Devices, Inc	602-949-0048
AZ	Tempe, Piper Sales Co.	602-949-0048
CA	Campbell, Analog Devices, Inc.	408-559-2037
CA	Santa Ana, Analog Devices, Inc.	714-641-9391
CO	Analog Devices, Inc.	303-443-5337
CO	Denver (Metro), Piper Sls Co	303-443-5337
CO	Longmont, Piper Sales Co.	303-651-2378
FL	Analog Devices, Inc	407-660-8444
FL	Orlando, Currie, Peak & Frazier	407-855-0843
FL	Tampa, Currie Peak & Frazier	813-963-1076
FL	W. Melbourne, Currie Peak & Frazier	407-724-6795
GA	Analog Devices, Inc	404-263-3719
GA	Analog Devices, Inc	404-263-0320
GA	Duluth, Currie, Peak & Frazier	404-497-9404
IL	Analog Devices, Inc	708-519-1777
IL	Buffalo Grove, Torkelson Assocs.	312-520-0710
IN	Indianapolis, Torkelson Assocs.	317-244-7867
IA	Cedar Rapids, Torkelson Assoc	319-373-0200
KS	Analog Devices, Inc	913-829-2800
KS	Olathe, Tech Sales Assocs.	913-829-2800
MD	Analog Devices, Inc	410-992-1995
MD	Columbia, Analog Devices, Inc.	410-992-1995
MA	Analog Devices, Inc.	617-329-4700
MA	Analog Devices, Inc	617-329-4700
MI	Anolog Devices	313-489-1500
MI	Anolog Devices	313-348-5795
MI	Anaglog Devices, Inc	313-489-1500
MN	Minneapolis, Torkelson Assocs.	612-835-2414
MO	Analog Devices, Inc	313-348-5795
MO	Analog Devices, Inc	314-521-2044
MO	Ferguson, Tech Sales	314-521-2044
NM	Analog Devices, Inc	505-828-1300
NM	Albuquerque, Piper Sales	505-828-1300
NY	Analog Devices, Inc	315-682-5571
NY	Analog Devices, Inc	516-366-0765
NY	Analog Devices, Inc	716-425-9100
NY	Fairport, B.B.D. Electrns	716-425-4101
NY	Huntington, Harwood-Sandler Assocs.	516-673-1900
NC	Analog Devices, Inc	919-460-7771
NC	Charlotte, Currier Peak & Frazier	704-846-1702
NC	Greensboro, Currie, Peak & Frazier	919-373-0380
OH	Analog Devices, Inc.	216-247-0060
OH	Dublin, Analog Devices, Inc.	614-792-5171
PA	Analog Devices, Inc	412-745-8441
PA	Ft. Washington, Analog Devices, Inc.	215-643-7790
TN	Smyrna, Currie, Peak & Frazier	615-459-0743
TX	Richardson, Analog Devices, Inc.	214-231-5094
UT	Analog Devices, Inc	801-466-9336
UT	Salt Lake City, Piper Sales	801-466-9336
WA	Seattle, Analog Devices, Inc.	206-575-6344
WV	Analog Devices, Inc.	412-745-8441
WI	Waukesha, Torkelson Assocs.	414-784-7736
Can	Analog Devices, Inc.	416-821-7800
Can	Analog Devices, Inc	613-564-0014
Can	Analog Devices, Inc	514-697-0801
Can	Analog Devices, Inc.	604-465-6892
Intl	Austria, Vienna, Analog Devices, Inc.	222/88-55-04-0
Intl	Belgium, Antwerpen, Analog Devices Int'l Inc.	03-237-16-72
Intl	Brazil, Sao Paulo, Hitech Comercial	11-531-9355
Intl	Denmark, Herlev, Analog Devices APS	42-84-58-00
Intl	Finland, Helsinki, Satt Elctrns.	0-8041041
Intl	France, Analog Devices, Inc.	1-46-66-25-25
Intl	France, Analog Devices, Inc.	76-41-91-83
Intl	Germany, Analog Devices	089-57-005-0
Intl	Germany, Analog Devices	030-391-90-35
Intl	Germany, Analog Devices	089-57-005-0
Intl	Germany, Analog Devices	030-391-90-35
Intl	Germany, Analog Devices	04181-80-51
Intl	Germany, Analog Devices	0221-68-60-06
Intl	Germany, Analog Devices	0711-88-11-33
Intl	Germany, Muenchen, Analog Devices GmbH	089-57-005-0
Intl	Hong Kong, Kowloon, General Engineers	5-8339013
Intl	India, Analog Sales	812-586301
Intl	Ireland, Analog Devices (United Kingdom)	932-253320
Intl	Israel, Analog Devices (Israel) Ltd.	052-911-415
Intl	Italy, Anolog Devices, Inc.	2-665-00-120
Intl	Italy, Analog Devices, SRL	11-24-87-789
Intl	Italy, Analog Devices SRL	6-86-200-306
Intl	Italy, Bologna, Dott. Ing. Giuseppe de Mico	51-555614
Intl	Japan, Osaka, Analog Devices K.K.	6-372-1814
Intl	Korea, Analog Devices, Inc.	2-554-3301
Intl	Netherlands, Analog Devices	1620-815-00
Intl	New Zealand, Auckland, W. Arthur Fisher Ltd.	9-592629
Intl	Norway, Lier, Bit Elekronikk S.A.	3-847099
Intl	Peoples Republic of China, Excelpoint Co. Inc.	1-890721 X120
Intl	Singapore, Excelpoint Sys PTE Ltd.	65-2848537
Intl	South Africa, Johannesburg, Anolog Data Products C.C.	11-882-1620
Intl	Spain, Madrid, Cometta S.A.	1-754-30-01
Intl	Sweden, Bromma, Analog Devices AB	8-282-740
Intl	Switzerland, Analog Devices, S.A.	21-803-25-50
Intl	Switzerland, Analog Devices, Inc.	1-820-01-02
Intl	United Kingdom, Analog Devices, Inc.	0932-246-200
Intl	United Kingdom, Analog Devices, Inc.	0932-25-33-20
Intl	United Kingdom, Analog Devices, Inc.	0506-30306
Intl	United States Of America, Analog Devices, Inc.	617-329-4700
PR	Analog Devices, Inc	809-753-8905

Distributors

AL	Allied	205-721-3500
AL	Bell	205-837-1074
AL	Hall-Mark	205-837-8700
AL	Pioneer	205-837-9300
AZ	Allied	602-437-9080
AZ	Bell	602-966-7800
AZ	Hall-Mark	602-437-1200
AZ	Wyle	602-437-2088
CA	Allied	415-770-0590
CA	Allied	818-882-6981
CA	Allied	213-373-8828
CA	Allied	714-727-3010
CA	Allied	916-632-3104
CA	Allied	619-279-2550
CA	Allied	415-952-9599
CA	Bell	310-826-6778
CA	Bell	916-652-0414
CA	Bell	408-734-8570
CA	Bell	818-879-9494
CA	Bell	714-895-7801
CA	Bell	619-268-1277
CA	Hall-Mark	818-773-4500
CA	Hall-Mark	714-727-6000
CA	Hall-Mark	619-268-1201
CA	Hall-Mark	408-432-4000
CA	Hall-Mark	916-624-9781
CA	Pioneer	800-535-1430
CA	Pioneer	213-320-4820
CA	Pioneer	619-434-4107
CA	Pioneer	408-954-9100
CA	Semi Dice	310-594-4631
CA	Semi Dice	714-952-2216
CA	Semi Dice	408-980-9777
CA	Wyle	714-863-9953
CA	Wyle	818-880-9000
CA	Wyle	800-288-9953
CA	Wyle	916-638-5282
CA	Wyle	800-627-9953
CA	Wyle	408-727-2500
CA	Wyle	619-565-9171
CO	Allied	303-790-1664
CO	Bell	303-691-9010
CO	Hall-Mark	303-790-1662
CO	Wyle	303-457-9953
CT	Allied	203-272-7730
CT	Bell	206-269-6801
CT	Hall-Mark	203-271-2844
CT	Pioneer	203-929-5600
FL	Allied	305-978-3008
FL	Allied	904-346-0761
FL	Allied	407-831-3331
FL	Allied	813-541-4660
FL	Bell	407-339-0078
FL	Chip Supply	407-298-7100
FL	Hall-Mark	407-830-5855
FL	Hall-Mark	305-971-9280
FL	Hall-Mark	813-541-7440
FL	Pioneer	407-834-9090
FL	Pioneer	305-428-8877
GA	Allied	404-497-9544
GA	Bell	404-662-0923
GA	Hall-Mark	404-623-4400
GA	Pioneer	404-623-1003
IL	Allied	708-918-0250
IL	Allied	708-535-0038
IL	Allied	708-860-0007
IL	Bell	708-640-1910
IL	Bell	217-328-1077
IL	Hall-Mark	708-860-3800
IL	Newark	312-784-5100
IL	Pioneer	708-495-9680
IN	Allied	317-875-0448
IN	Bell	317-875-8200
IN	Bell	219-423-3422
IN	Hall-Mark	317-872-8875
IN	Pioneer	317-573-0880

IA	Allied	515-223-6488
IA	Bell	319-395-0730
KS	Allied	913-599-6227
KS	Hall-Mark	913-888-4747
KY	Allied	502-452-2293
KY	Bell	800-582-7492
KY	Bell	800-445-8795
LA	Allied	504-885-1195
MD	Allied	301-381-1560
MD	Bell	410-290-5100
MD	Hall-Mark	301-988-9800
MD	Pioneer	301-921-0660
MA	Alliance	617-729-5800
MA	Alliance	617-756-1910
MA	Allied	508-667-7921
MA	Allied	617-255-0361
MA	Bell	508-474-8880
MA	Hall-Mark	508-667-0902
MA	Hall-Mark	508-935-9777
MA	Pioneer	617-861-9200
MA	Semi Dice	508-238-8344
MA	Wyle	617-272-7300
MI	Allied	313-462-0190
MI	Allied	616-949-8200
MI	Bell	800-582-7492
MI	Bell	313-347-6633
MI	Hall-Mark	313-416-5800
MI	Pioneer	616-698-1800
MI	Pioneer	313-525-1800
MN	Allied	612-881-0838
MN	Bell	612-941-1493
MN	Hall-Mark	612-881-2600
MN	Pioneer	612-944-3355
MO	Allied	314-291-7031
MO	Bell	314-647-2355
MO	Hall-Mark	314-291-5350
MO	Pioneer	314-542-3077
NE	Allied	402-697-0038
NH	Allied	603-883-3006
NJ	Allied	201-428-3350
NJ	Allied	609-234-7769
NJ	Bell	201-227-6060
NJ	Hall-Mark	609-235-1900
NJ	Hall-Mark	201-515-3000
NJ	Pioneer	201-575-3510
NM	Alliance	505-292-3360
NM	Bell	505-292-2700
NY	Allied	516-248-2360
NY	Allied	914-452-1470
NY	Allied	716-425-3850
NY	Hall-Mark	716-425-3300
NY	Hall-Mark	516-737-0600
NY	Pioneer	716-381-7070
NY	Pioneer	516-921-8700
NY	Semi Dice	516-234-7676
NC	Allied	919-876-5845
NC	Bell	919-821-4041
NC	Hall-Mark	919-872-0712
NC	Pioneer	919-544-5400
NC	Pioneer	704-527-8188
NC	Pioneer	919-460-1530
OH	Allied	513-771-6990
OH	Allied	216-248-4200
OH	Allied	614-785-1270
OH	Bell	800-348-4619
OH	Bell	513-435-8660
OH	Bell	513-434-8231
OH	Hall-Mark	216-349-4632
OH	Hall-Mark	614-888-3313
OH	Pioneer	216-587-3600
OH	Pioneer	513-236-9910
OH	Pioneer	614-221-0043
OK	Allied	918-664-0844
OK	Hall-Mark	918-254-6110
OK	Pioneer	918-665-7840
OR	Allied	503-245-4225
OR	Bell	503-644-1500
OR	Wyle	503-643-7900
PA	Allied	717-975-3570
PA	Allied	412-367-4124
PA	Bell	215-953-2800
PA	Bell	800-525-6666
PA	Hall-Mark	215-355-7300
PA	Pioneer	215-674-4000
PA	Pioneer	412-782-2300
SC	Allied	803-288-8835
SC	Bell	800-322-7908
TN	Allied	901-367-2895
TN	Bell	615-367-4400
TX	Allied	817-595-3500
TX	Allied	512-389-3771
TX	Allied	214-553-4370
TX	Allied	214-570-5196
TX	Allied	915-779-6294
TX	Allied	713-446-8005
TX	Allied	713-455-3993
TX	Bell	214-690-0466
TX	Hall-Mark	214-343-5000
TX	Hall-Mark	512-258-8848
TX	Hall-Mark	214-553-4300
TX	Hall-Mark	713-781-6100
TX	Pioneer	512-835-4000
TX	Pioneer	214-386-7300
TX	Pioneer	713-495-4700
TX	Pioneer	512-377-3440
TX	Wyle	512-345-8853
TX	Wyle	214-235-9953
TX	Wyle	713-879-9953
TX	Wyle	800-888-9953
UT	Allied	801-261-5244
UT	Bell	801-255-9611
UT	Hall-Mark	801-973-4737
UT	Wyle	801-974-9953
VA	Allied	804-363-8862
VA	Allied	703-644-9515
WA	Allied	206-547-2827
WA	Bell	206-867-5410
WA	Hall-Mark	206-547-0415
WA	Wyle	206-881-1150
WI	Allied	414-796-1280
WI	Hall-Mark	414-797-7844
WI	Pioneer	414-784-3480
Can	Bell	414-547-8879
Can	Future	514-694-7710
Can	Future	613-820-8313
Can	Future	416-638-4771
Can	Future	604-294-1166
Can	Future	403-436-2858
Can	Future	416-612-9200
Can	Zentronics	403-482-3038
Can	Zentronics	604-273-5575
Can	Zentronics	403-295-8838
Can	Zentronics	416-564-8600
Can	Zentronics	613-226-8840
Can	Zentronics	418-654-1077
Can	Zentronics	204-694-1957
Can	Zentronics	514-737-9700
Can	Zentronics	416-798-7710
Can	Zentronics	416-564-9600
Intl	Australia, N.S.D.	3-8900970
Intl	Australia, N.S.D.	2-646-5255
Intl	Australia, N.S.D.	7-845-1911
Intl	Australia, N.S.D.	8-211-8499
Intl	Austria, A.D.E.C.	0222-88-92-876-0
Intl	Austria, RS-Comps	02852-505
Intl	Belgium, Betea	02-725-1080
Intl	Belgium, TEXIM Elctrns	02-460-52-82
Intl	Brazil, Hicad Sistemas Ltda	11-531-9355
Intl	Bulgaria, K2 Elctrns	92-890412
Intl	China, Beijing ROC, Excelpoint Co Ltd	1-500-7788
Intl	Czechoslovakia, AMTEK SPOL SRO	5-750-988
Intl	Czechoslovakia, Tesla Piestany	838-522306
Intl	Denmark, Mer EL A/S	42-57-10-00
Intl	Finland, Oxxo Oy	90-3455-377
Intl	France, Dimacel Composants	1-40-87-70-00
Intl	France, Avnet Diffusion	1-49-65-26-26
Intl	France, RS Comps	44-84-72-72
Intl	France, Scaib	1-46-87-23-13
Intl	Germany, SASCO GmbH	089-46-11-0
Intl	Germany, Semitron	07742-80-01-0
Intl	Germany, Spoerle Elctrns	06103-30-4-0
Intl	Germany, Spoerle Elctrns	0341-59-23-22
Intl	Greece, Micrelec	1-539-02-69
Intl	Hong Kong, Gen Engrs	8339013
Intl	Hong Kong, Tektron Elctrns (HK) Ltd	388-0629
Intl	Hungary, SMD Technlg KFT	1-189-58-15
Intl	India, Analog Sales	212-342150
Intl	India, Analog Sales	11-6862460
Intl	India, Analog Sales	812-560506
Intl	Italy, De Mico	2-95343600
Intl	Italy, Hellis SAS	536-804104
Intl	Italy, La Tecknica Due	11-2425905
Intl	Italy, Pantronic SRL	6-6276209
Intl	Italy, Special Ind	2-66805177
Intl	Italy, Tecknica Due	438-555447
Intl	Korea, Analog World	2-7015993
Intl	Korea, Tong Baek Elctrns	2-715-6625
Intl	Malaysia, Excelpoint Sus (PTE) Ltd	03-2448929
Intl	Mexico, Canadien	83-652020
Intl	Netherlands, Texim Elctrns BV	05427-333-33
Intl	Netherlands, TME Comps BV	073-211010
Intl	New Zealand, NSD Australia	61-3-8900970
Intl	Norway, BIT Elektronikk	02-98-13-70
Intl	Poland, Alfine	61-301-450
Intl	Portugal, ATD Elctrns	1-847-2200
Intl	Portugal, Comelta	1-942-4106
Intl	Romania, Top 9 Plus	400-12787
Intl	Russia, Argus Trading Ltd	7095-945-2777
Intl	Russia, Tesla Piestany	838-522306
Intl	Singapore, Excelpoint Sys PTE	741-8966
Intl	So. Africa, Analog Data Prods CC	11-444-8160
Intl	Spain, Comelta	1-7543-001
Intl	Spain, Selco	1-326-4213
Intl	Sweden, Integrated Elektronik	08-80-46-85
Intl	Switzerland, Eljapex AG	56-27-57-77
Intl	Taiwan, Andev Technlg Co Ltd	2-763-0910
Intl	Taiwan, Jeritronics Ltd	2-882-0710
Intl	Taiwan, Lite-On Inc	2-918-6699
Intl	Turkey, Elektro	1-337-22-45
Intl	UK, Arrow Elctrns (UK) Ltd	0234-270-777
Intl	UK, Avnet Access	0462-48088
Intl	UK, Jermyn Distrb	0732-743-743
Intl	UK, Phoenix Elctrns Ltd	0555-575-66
Intl	UK, Polar Elcrns Ltd	0525-377-093
Intl	Yugoslavia, ALMA Elctrns	41-428-678
Intl	Yugoslavia, Elctra	40-826545

ANALOG MICROSYSTEMS, 3450 S. Broadmont,
Tucson, Arizona 85713

ANALOG SYSTEMS, P.O. Box 17389, Tucson,
Arizona 85731, Tel: 602-290-1818

ANALOGIC CORPORATION, 8 Centennial Drive,
Peabody, Massachusetts 01960, Tel: 508-977-3000

Sales Office & Representatives

Intl	England, Berkshire, Analogic Ltd.	44-3-44-860111
Intl	W. Germany, Wiesbaden, Analogic GmbH	49-6122-70060
Intl	Wakefield, Analogic Corp.	508-977-3000

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FAX: 602-888-3329

APEX MICROTECHNOLOGY
CORPORATION, 5980 N. Shannon Road, Tucson,
Arizona 85741, Tel: 602-690-8600, FAX: 602-888-3329

Sales Office & Representatives

AZ	Tucson, Apex Microtechnology	602-690-8600
CA	Los Altos, Kolm Mktg Assoc.	415-948-2635
CA	Manhattan Bch, Com-Star	310-318-9803
CA	Rancho Cucamonga, Com-Star	909-944-5744
CT	Lebanon, Signal Sales	203-889-4050
FL	Seminole, Q-Rep	407-253-9713
IL	Palatine, Vine Sales Inc	708-934-5476
MD	Ellicot City, Nelson Elctrns.	410-747-7887
MA	Woburn, Signal Sales	617-938-7872
MN	Bloomington, Industrial Representateive Inc.	612-854-8027
NH	Newton, Signal Sales	603-382-3669
NJ	East Windsor, U.S. Tech Mktg	609-448-4813
NY	Kings Park, U.S. Tech Mktg	516-724-4250
WI	Milwaukee, Star Engnr	414-645-3680
Can	Ont., Kanata, J-Squared Technlgs	613-592-9540
Can	Ont., Rexdale, J-Squared Technlgs	416-674-0927
Can	Que., Pointe Claire, J-Squared Technlgs	514-694-8330

Intl	Austria, Wien, Nano-80 GmbH.	43-1-505-15-220
Intl	Belguium, Kontich, Alcom Electrns BVBA	323-458-3003
Intl	Denmark, Kokkedal, C-88 A.S.	45-52-24-48-88
Intl	Finland, Espoo, SW Instrs	358-0-522-122
Intl	France, Les Ulis Cedex, Microel	(33) (1) 6907-0824
Intl	Germany, Friedrichsdorf, Amppower GmbH	49-6172-5113
Intl	Hong Kong ROC, General Engineers	852-08339013
Intl	India, Pune, IRYS Electrns Engnr Services	91-212-339836
Intl	Israel, Petah-Tikva, Boran Technologies Ltd.	972-3-9345171
Intl	Italy, Milano, Consystem, s.r.l.	39-2-99041977
Intl	Japan, Tokyo, Kyokuto Boeki Kaisha, Ltd.	81-33244-3787
Intl	Korea,Seoul, Mainsail Mercantile Ltd.	82-02-745-2761
Intl	Malaysia, Kuala Lumpur, Excelpoint Sys	63-03-244-8929
Intl	Netherlands, Ijssel, Alcom Electrns BV	31-10-451-9533
Intl	Norway, Oslo, NC Scandcomp	47-2-500650
Intl	PRC, Beijing, Shanwei Excelpoint Enterprise Co.	86-1-5007-788 ext.623
Intl	PRC, Shanghai, Shanwei Excelpoint Enterprise Co.	86-21-4370050 ext. 6216
Intl	S. Australia, Adelaide, K.D. Fisher & Co. Pty. Ltd.	61-8-277-3288
Intl	Singapore, Excelpoint Sys	65-741-8966
Intl	South Africa, Cape Town, Eagle Elec Co Ltd	27-021-24-4071
Intl	Spain, Madrid, ADM Electrna S.A.	34-1-530-4121
Intl	Sweden, Spanga, Egevo Elektronik AB	46 8-7959650
Intl	Taiwan, Taipei, Chieftron Enterprise Co	886-02-722-3570
Intl	Turkey, Istanbul, Elektro	90-1-337-2245
Intl	United Kingdom, Oxfordshire, M.E.T.L.	44-844-278781

AMCC (APPLIED MICRO CIRCUITS CORP), 6195 Lusk Blvd., San Diego, California 92121, Tel: 619-450-9333

Sales Office & Representatives

AZ	Tempe, Quatra Assocs., Inc.	602-820-7050
CA	Irvine, Premier Tech	714-262-0522
CA	Mountain View, Taarcom	415-960-1550
CA	Roseville, Taarcom	916-782-1776
CA	San Diego, Littlefield & Smith Assoc.	619-455-0055
CA	San Jose, AMCC Regnl. Office	408-289-1190
CO	Longmont, Luscombe Eng. Co.	303-772-3342
CO	Parker, Luscombe Eng. Co.	303-841-7478
CT	Southbury, Dynamic Tech.	203-262-6220
FL	Melbourne, Photon Sls., Inc.	407-259-8999
IL	Hoffman Estates, Victory Sls., Inc.	708-490-0300
IN	Fort Wayne, Corrao Marsh, Inc.	219-482-2725
IN	Greenfield, Corrao Marsh, Inc.	317-462-4448
KS	Overland Park, Markline Technologies	913-681-8880
MD	Baltimore, DGR, Inc.	301-377-4788
MD	Lutherville, DGR, Inc.	410-583-1360
MD	Thurmont, DGR, Inc.	301-271-4209
MA	Burlington, AMCC Reg. Office	617-270-0674
MA	Westwood, CompRep Assoc	617-329-3454
MN	New Hope, Customer 1st	612-533-5604
MO	Lake St. Louis, Markline Tech	314-625-6222
NJ	Hasbrouch Hts., Comp-Tech Sls., Inc.	201-288-7400
NM	Albuquerque, Quatra Assocs., Inc.	505-821-1455
NY	Bohemia, AMCC Reg. Office	516-563-0401
NY	Buffalo, Quality Comps.	716-837-5430
NY	Manlius, Quality Comps.	315-682-8885
OH	Rocky River, Norm Case Assoc.	216-333-0400
OR	Beaverton, Comps West	503-642-9110
PA	Hatboro, Delta Tech	215-957-0920
TX	Austin, Logic 1 Sales, Inc.	512-345-2952
TX	Houston, Logic 1 Sales, Inc.	713-444-7594
TX	Plano, AMCC Reg. Office	214-423-7989
TX	Richardson, Logic 1 Sales,Inc.	214-234-0765
UT	Sandy, First Source	801-943-6894
VA	Herndon, DGR, Inc.	703-742-0060
WA	Redmond, Comps West	206-885-5880
WI	Brookfield, Victory Sls., Inc.	414-789-5770
Can	Ontario, Electrn Sales Professionals	613-567-8547
Intl	Denmark, Copenhagen, Exatec	45-31-19-1022
Intl	England, Bristol, AM&T	44-272237594
Intl	England, Hants, Amega Elec	44-256330301
Intl	France, Sevres Cedex, A2M	33-1-46-237903
Intl	Germany, Hannover, Topas Electrn	49-51-1131217
Intl	Germany, Planegg, Scantec	49-89-8598021
Intl	Israel, Tiqva, EIM	972-3-9233257
Intl	Italy, Milano, ACSIS	39-248022522
Intl	Japan, Kanagawa, Teksel	81-448127430
Intl	Korea, Seoul, SEBO Trading	82-2-326-0854
Intl	Singapore, Thailand, Gates Engnr	65-299-9937

APPLIED MICROSYSTEMS CORPORATION, P.O. Box 97002, Redmond, Washington 98073-9702, Tel: 206-882-2000, 800-426-3925

APTEK MICROSYSTEMS, 700 N.W. 12th Avenue, Deerfield Beach, Florida 33442, Tel: 305-421-8450, TELEX: 441020

ARRAY MICROSYSTEMS, 1420 Quail Lake Loop, Colorado Springs, Colorado 80906, Tel: 719-540-7999, FAX: 719-540-7950

Sales Office & Representatives

AL	Huntsville, EMA	205-830-4030
AZ	Tempe, Electrn Dev & Sls Inc	602-438-1547
CA	Carlsbad, LA Sales, Inc	619-434-7420
CA	Long Beach, LA Sales, Inc	310-491-0791
CA	Pasadena, LA Sales Inc	818-398-9880
CA	Sunnyvale, Westech	408-735-8687
CO	Englewood, Comp Sls,inc	303-779-8060
FL	Boca Raton, Perrott Assocs	407-362-0191
FL	Casselberry, Perrott Assocs	407-830-0094
FL	Melbourne, Perrott Assocs	407-676-0305
FL	Tampa, Perrott Assocs	813-985-1900
GA	Roswell, EMA	404-992-7240
KS	Olathe, Impaq Sls Co	913-780-6565
MD	Laurel, SPSI	301-953-0110
MA	Carlisle, ESI Computing	508-369-8499
MI	Ypsilanti, Meta tech Sls Inc	313-485-0553
MN	Burnsville, Jan-Ray Sys Inc	612-892-5111
MN	Minnetonka, Jen-Ray Sys, Inc	612-933-8545
NM	Albuquerque, Nelco Electronix	505-293-1399
NY	Saugerties, BeckRep	914-246-3031
NC	Raleigh, EMA	919-846-6888
OH	Aurora, Meta tech Sls Inc	216-562-8772
OR	Portland, Technlg Source Inc	503-292-5628
PA	King Of Prussia, KSI	215-783-6400
TX	Austin, IMPAQ Sls Co	512-335-9666
TX	Houston, IMPAQ Sls Co	713-820-0288
TX	Irving, IMPAQ SLs Co	214-650-0000
UT	Midval, Utah Comp Sls, Inc	801-561-5099
Can	B.C., Burnaby, Tramark Elctrns Ltd	604-433-0464
Can	Ont., Mississauga, Tracan Elctrns Corp	416-625-7752
Can	Ont., Nepean, Tracan Elctrns Corp	613-596-9760
Can	Que., Montreal, Tracan Elctrns Corp	514-385-0523

Distributors

Intl	France, Les Ulis Cedex, Micrel	33-1-69070824
Intl	Germany, MUnchen, Alfatron GmbH	49-89-420491-0
Intl	Israel, Tel Aviv, Tritech Ltd	972-3-544-7293-4-5
Intl	Italy, Milano, MicroElit S.P.A.	39-2-4817900
Intl	Japan, Tokyo, Nippon Imex Corp	81-03-3321-8000
Intl	Netherlands, Matronix	31-30-414644
Intl	Spain, Madrid, Selco	34-1-3264213
Intl	Sweden, Danderyd, Setron Sweden AB	46-8-7530055
Intl	U.K., England, Metl	44-844-278781

ASPEC TECHNOLOGY, INC., 3901 Burton Drive, Santa Clara, California 95054, Tel: 408-988-4411, FAX: 408-988-4767

ASPEN SEMICONDUCTOR CORP., 4001 North First Street, San Jose, California 95134, Tel: 408-456-1800

ASTEC SEMICONDUCTOR, 255 Sinclair Frontage Road, Milpitas, California 95035, Tel: 408-263-8300, FAX: 408-263-8340

AT&T MICROELECTRONICS, 52AL330240, 555 Union Blvd., Allentown, Pennsylvania 18103, Tel: 800-372-2447, FAX: 215-778-4106

Sales Office & Representatives

AZ	Phoenix, US Regional OEM Sls Off.	602-844-6529
CA	Los Angeles, US Regional OEM Sls Off.	714-220-6223
CA	San Francisco, US Regional OEM Sls Off.	408-522-5555
CO	Denver, US Regional OEM Sls Off.	303-290-3708
GA	Atlanta, US Regional OEM Sls Off.	404-446-4700
IL	Chicago, US Regional OEM Sls Off.	708-290-3335
MA	Boston, US Regional OEM Sls Off.	508-626-2161
MN	Minneapolis, US Regional OEM Sls Off.	612-885-4300
NY	Poughkeepsie, US Regional OEM Sls Off.	914-485-7744
NC	Raleigh, US Regional OEM Sls Off.	919-881-8023
OR	Portland, US Regional OEM Sls Off.	503-244-3883
PA	Allentown, US Regional OEM Sls Off.	215-770-3343
TX	Dallas, US Regional OEM Sls Off.	214-556-8800
Intl	England, Bracknell, AT&T Microelec	44-344-487-111
Intl	England, Cheshire, AT&T Microelec	44-477-37179
Intl	Finald, Espoo, AT&T Microelec	358-0-859-2955
Intl	France, Paris, AT&T Microelec	33-1-4767-4767
Intl	Germany, Munchen, AT&T Microelec	49-89-950860-0
Intl	Italy, Milan, AT&T Microelec	39-2-6601-1800
Intl	Japan, Tokyo, AT&T Microelectroincs	81-3-5421-1600
Intl	Portugal, ATD Electrna L da	35-1-8472-200
Intl	Singapore, AT&T Microelec	65-778-8833
Intl	Spain, Madrid, AT&T Microelectronica Espana	34-1-807-1700
Intl	Sweden, Stockholm, AT&T Microelec	46-8700-5230
Intl	Taiwan, Taipei ROC, AT&T Microelec	886-2-711-3091
Intl	West Germany, Stuttgart, AT&T Microelec	49-711-44-20-50

Distributors

AL	Huntsville, Arrow/Schweber Elctrns	205-837-6955
AZ	Tempe, Anthem Elctrns, Inc	602-966-6600
AZ	Tempe, Arrow/Schweber Elctrns	602-431-0030
CA	Calabasas, Arrow/Schweber Elctrns	818-880-9686
CA	Chatsworth, Anthem Elctrns, Inc	818-775-1333
CA	Irvine, Anthem Elctrns, Inc	714-768-4444
CA	Rocklin, Anthem Elctrns, Inc	916-624-9744
CA	San Diego, Anthem Elctrns, Inc	619-453-9005
CA	San Diego, Arrow/Schweber Elctrns	619-565-4800
CA	San Jose, Anthem Elctrns, Inc (Corp Off)	408-452-2219
CA	San Jose, Arrow/Schweber Elctrns	408-441-9700
CA	San Jose, Capstone Elctrns San Jose Reg Ctr	408-453-9804
CA	San Jose, Merit Elctrns	408-434-0800
CA	Tustin, Arrow/Schweber Elctrns	714-838-5422
CA	Tustin, Capstone Elctrns-Orange Cty Reg Ctr	714-730-0349
CO	Aurora, Capstone Elctrns (Hdqts)	303-375-1300
CO	Englewood, Anthem Elctrns, Inc	303-790-4500
CO	Englewood, Arrow/Schweber Elctrns	303-799-0258
CT	Wallingford, Arrow/Schweber Elctrns	203-265-7741
CT	Waterbury, Anthem Elctrns, Inc	203-575-1575
FL	Deerfield Beach, Arrow/Schweber Elctrns	305-429-8200
FL	Lake Mary, Arrow/Schweber Elctrns	407-333-9300
GA	Duluth, Arrow/Schweber Elctrns	404-497-1300
IL	Itasca, Arrow/Schweber Elctrns	708-250-0500

IL	Itasca, Capstone Elctrns Chicago Reg Ctr	708-250-0300
IL	Schaumburg, Anthem Elctrns, Inc	708-884-0200
IN	Indianapolis, Arrow/Schweber Elctrns	317-299-2071
IA	Cedar Rapids, Arrow/Schweber Elctrns	319-395-7230
KS	Lenexa, Arrow/Schweber Elctrns	913-541-9542
MD	Columbia, Anthem Elctrns, Inc	301-995-6640
MD	Columbia, Arrow/Schweber Elctrns	301-596-7800
MA	Wilmington, Anthem Elctrns, Inc	508-657-5170
MA	Wilmington, Arrow/Schweber Elctrns	508-658-0900
MA	Wilmington, Capstone Elctrns Boston Reg Ctr	508-657-5874
MI	Livonia, Arrow/Schweber Elctrns	313-462-2290
MN	Eden Prairie, Anthem Elctrns, Inc	612-944-5454
MN	Eden Prairie, Arrow/Schweber Elctrns	612-941-5280
NJ	Holmdel, Arrow/Schweber Elctrns	908-949-4700
NJ	Marlton, Arrow/Schweber Elctrns	609-596-8000
NJ	Marlton, Capstone Elctrns Philadelphia Reg Ctr	609-596-7500
NJ	Pine Brook, Anthem Elctrns, Inc	201-227-7960
NJ	Pine Brook, Arrow/Schweber Elctrns	201-227-7889
NY	Commack, Anthem Elctrns, Inc	516-493-6600
NY	Hauppauge, Arrow/Schweber Elctrns	516-231-1000
NY	Melville, Arrow/Schweber Elctrns Grp (Hdqts)	516-391-1300
NY	Rochester, Arrow/Schweber Elctrns	716-427-0300
NC	Raleigh, Arrow/Schweber Elctrns	919-876-3132
NC	Raleigh, Capstone Elctrns Raleigh Reg Ctr	919-954-0600
OH	Centerville, Arrow/Schweber Elctrns Grp	513-435-5563
OH	Solon, Arrow/Schweber Elctrns	216-248-3990
OK	Tulsa, Arrow/Schweber Elctrns	918-252-7537
OR	Beaverton, Anthem Elctrns, Inc	503-643-1114
OR	Beaverton, Almac Elctrns Corp	503-629-8090
PA	Horsham, Anthem Elctrns, Inc	215-443-5150
PA	Pittsburgh, Arrow/Schweber Elctrns	412-963-6807
TX	Austin, Arrow/Schweber Elctrns	512-835-4180
TX	Carrollton, Arrow/Schweber Elctrns	214-380-6464
TX	Carrollton, Capstone Elctrns Dallas Reg Ctr	214-380-9049
TX	Houston, Arrow/Schweber Elctrns	713-530-4700
TX	Richardson, Anthem Elctrns, Inc	214-238-7100
UT	Salt Lake City, Anthem Elctrns, Inc	801-973-8555
UT	Salt Lake City, Arrow/Schweber Elctrns	801-973-6913
WA	Bellevue, Almac Elctrns Corp (Hdqts)	206-643-9992
WI	Brookfield, Arrow/Schweber Elctrns	414-792-0150
Can	Ont, Mississauga, Capstone Elctrns Canada Hub	416-670-2010
Can	Ontario, Nepean, Arrow/Schweber Elctrns	416-670-7769
Can	Que, Dorval, Arrow/Schweber Elctrns	514-421-7411

ATMEL CORPORATION, 2125 O'Nel Drive, San Jose, California 95131, Tel: 408-441-0311, FAX: 408-436-4200

Sales Office & Representatives

AL	Huntsville, Electrn Mktg Assoc	205-880-8050
AZ	Tempe, Quatra Assoc, Inc.	602-820-7050
CA	Cameron Park, ProMerge Sales, Inc.	916-676-2025
CA	Fair Oaks, ProMerge Sales, Inc	916-965-3255
CA	Irvine, Atmel (Southwest Office)	714-727-3762
CA	San Diego, Harper & Strong	619-549-5360
CA	San Jose, Atmel (Northwest Office)	408-436-4270
CA	San Jose, ProMerge Sales, Inc.	408-453-5544
CA	San Jose, Atmel Design Center	408-441-0311
CA	Signal Hill, Harper & Strong	310-424-3030
CO	Colorado Springs, Atmel	719-576-3300
CO	Englewood, Thorson Rocky Mountain	303-773-6300
CT	Meriden, DELTA-CONN Tech Sales	203-634-8558
FL	N Ft Lauderdale, Comp Design Mktg	305-726-5444
FL	Orlando, Comp Design Mktg	407-240-3903
FL	Tampa, Comp Design Mktg	813-886-9721
GA	Atlanta, Electroinic Mktg Assoc	404-448-1215
IL	Hoffman Estates, Atmel (N Central)	708-310-1200
IL	Rolling Meadows, Phase II Mktg	708-577-9401
IN	Fort Wayne, Corrao Marsh, Inc.	219-482-2725
IN	Greenfield, Corrao Marsh, Inc.	317-462-4446
IA	Cedar Rapids, Dy-tronix Inc.	319-377-8275
KS	Leawood, Dy-tronix Inc.	913-339-6333
KS	Wichita, Dy-tronix Inc.	316-838-0884
MD	Columbia, Avtek Assoc	301-740-5100
MD	Hanover, Atmel Design Center	410-712-4950
MA	Braintree, Atmel (Northeast Office)	617-849-0220
MA	Tewksbury, Professional Comp Assoc.	508-858-0100
MI	Bloomfield Hills, Trilogy Mktg Corp	313-338-2470
MN	Bloomington, PSI	612-944-8545
MO	Bridgeton, Dy-tronix Inc.	314-291-4777
NJ	Mahwah, Northeast Comps	201-825-0233
NM	Albuquerque, Quatra Assocs	505-296-6781
NY	E. Rochester, Empire Tech Assoc	716-381-8500
NY	Skaneateles, Empire Tech Assoc	315-685-5703
NC	Matthews, Elctrn Mktg Assoc	704-845-2236
NC	Raleigh, Electrn Mktg Assoc	919-847-8800
NC	Raleigh, Atmel (Southeast)	919-850-9889
OH	Cincinatti, Luebbe Sales Co	513-530-0600
OH	Dayton, Luebbe Sales Co.	513-438-0490
OH	Westlake, Luebbe Sales Co.	216-899-0071
OR	Tirgard, Earl and Brown Co., Inc.	503-639-2100
PA	Erdenheim, Omni Sales	215-233-4600
PA	Pittsburg, Luebbe Sales Co.	412-364-0490
TX	Austin, Quad State Sls and Mktg	512-346-7002
TX	Dallas, Quad State Sls and Mktg	214-669-8567
TX	Dallas, Atmel (S Central)	214-733-3366
TX	Houston, Quad State Sls and Mktg	713-893-8585
UT	Salt Lake City, Thorson Rocky Mtn.	801-942-1683
VA	Esmont, Avtek Assoc	804-295-1294
WA	Redmond, Earl and Brown Co., Inc.	206-885-5064
WI	Wauwatosa, Phase II Mktg	414-771-9986
Can	Ontario, Brampton, Clark-Hurman Assoc.	416-840-6066
Can	Ontario, Nepean, Clark-Hurman Assoc.	613-727-5626
Can	Quebec, Pointe Claire, Clark-Hurman Assoc.	514-426-0453
Intl	Australia, Leichnardt, Braemac Pty Ltd	61-2858-5966
Intl	Austria, Perchtoldsdorf, Codico Gesmbh & Co KG	43-222-862428
Intl	Belgium, Zaventem, Acal Auriema	32-2-720-5983
Intl	Brazil, Sao Paulo, Hastec	55-11-522-1799
Intl	Bulgaria, Sofia, Rila c/o Nercom AG	359-2707597
Intl	Denmark, Horsholm, Merel A/S	45-42-571000
Intl	England, Camberley, Surrey, Atmel U.K., Ltd	44-276-686677
Intl	England, Essex, Pronto Electrn Sys. Ltd	44-815-546222
Intl	England, Sevenoaks, Kent, Impulse Elctrns	44-732-743110
Intl	England, Twyford, Berks, GD Technik LTD	44-734-432277
Intl	Finland, Espoo, Komdel OY	358-0-5023200
Intl	France, Les Ulis Cedex, Micro Puissance	33-1-69071211
Intl	France, Rungis Cedex, Newtek	33-1-46872200
Intl	Germany, Frankenthal, MSC Vertriebs GmbH	49-6233-26643
Intl	Germany, Frankfurt, Atmel GmbH	49-69-7075910
Intl	Germany, Heidenhiem, Ineltek GmbH	49-7321-20077
Intl	Germany, Jena-Goschwitz, MSC Vertriebs GmbH	37-3641-7688011
Intl	Germany, Leonberg, MSC Vertriebs GmbH	49-7152-26031
Intl	Germany, Moenchengladbach, Silicom Electrns Vertriebs	49-2161-15074
Intl	Germany, Monchengladbach, MSC Vertriebs GmbH	49-2166-46071
Intl	Germany, Munchen, MSC Vertriebs GmbH	49-89-4361046
Intl	Germany, Wiesbaden, MSC Vertriebs GmbH	49-611-718093
Intl	Hong Kong, Kowloon, Atmel Asia, Ltd	852-7219778
Intl	Hungary, Budapest, Nercom Informatik KFT	36-2610433
Intl	Hungary, Budapest, Nercom AG	36-118-03252
Intl	Israel, Herzlia, Unitech, Ltd.	972-52-576-006
Intl	Italy, Cassina de Fecchi, CEFRA S.p.A	39-2-9530-2777
Intl	Italy, Milano, Lasi Electrna	39-2-66101370
Intl	Italy, Romano Canavese, CEFRA S.p.A	39-125-713689
Intl	Japan, Chiyoda-Ku, Atmel Japan K.K.	81-3-5259-0211
Intl	Japan, Chuo-Ku, Osaka, Sumisho Elecs Dvcs	81-6-263-5131
Intl	Japan, Kita-Ku, Takachiho Koheki Co Ltd	81-6-313-0671
Intl	Japan, Naka-Nagoya, Sumisho Elctrns Dvcs	81-52-953-1291
Intl	Japan, Tokyo, MCM Japan Tama Sls Off.	81-423-72-8600
Intl	Japan, Tokyo, MCM Japan	81-3-3487-8477
Intl	Japan, Tokyo, Takachiho Koheki Co Ltd	81-3-3355-6695
Intl	Japan, Tokyo, Chiyoda-Ku, Kanto Electrns Corp	81-3-3257-6255
Intl	Japan, Tokyo, Chiyoda-Ku, Sumisho Electrns Devices	81-3-5399-5951
Intl	Japan, Toyko, Atmel Japan K.K.	81-3-5259-0211
Intl	Korea, Seoul, Atmel Korea, Ltd	82-2-8421695
Intl	Korea, Seoul, D & S Corp	82-2-5754490
Intl	Netherlands, Eindhoven, Acal Auriema	31-40-502602
Intl	Norway, Skedsmokorset, BT Hightech A/S	47-6-879330
Intl	Portugal, Lisboa, Anatronic-Portugal S.A.	351-1-7933299
Intl	Singapore, Atmel Singapore Pte., Ltd	65-299-9212
Intl	Singapore, Hamilton Elcts Pte, Ltd	65-283-7828
Intl	Spain, Barcelona, Anatronic S.A.	34-3-258-19-06
Intl	Spain, Madrid, Anatronic S.A.	1-542-44-55
Intl	Sweden, Sollentuna, Lagercrantz Keltech AB	46-88620693
Intl	Switzerland, Anatec AG	41-42-412441
Intl	Taiwan, Taipei, Prospect Technology	886-2-820-5353
Intl	Taiwan, Taipei, Allreach	886-02-321-4229
Intl	Taiwan, Taipei, Neolec Intl Inc	886-2-736-9973
Intl	Taiwan, Taipei Hsien, Princeton Tech Corp	886-2-917-8856

Distributors

AL	Huntsville, Nu Horizons	205-722-9330
AL	Huntsville, Time Electrns	800-824-6598
AZ	Scottsdale, Added Value	602-951-9788
AZ	Tempe, Insight Electrns	602-829-1800
AZ	Tempe, Time Electrns	602-967-2000
CA	Agoura, Insight Electrns	818-707-2100
CA	Agoura Hills, Time Electrns	818-707-2890
CA	Chatsworth, Time Electrns	818-998-7200
CA	Irvine, Insight Electrns	800-677-7716
CA	Reseda, Jan Devices	818-708-1100
CA	San Diego, Time Electrns	619-674-2800
CA	San Diego, Insight Electrns	619-587-9757
CA	San Diego, All American	800-831-8300
CA	San Jose, All American	408-943-1200
CA	San Jose, Merit Electrns	408-434-0800
CA	Sunnyvale, Insight Electrns	408-720-9222
CA	Sunnyvale, Time Electrns	408-734-9888
CA	Torrance, AllAmerican	213-320-0240
CA	Torrance, Time Electrns	213-320-0880
CA	Tustin, Added Value	714-259-8258
CA	Tustin, Time Electrns	714-669-0100
CO	Englewood, Time Electrns	303-721-8882
CO	Wheatridge, Added Value (AVED)	303-422-1701
CT	Danbury, Phase I Technology	203-791-9042
CT	Milford, Milgray/Connecticut	203-878-5538
CT	Wallingford, Cronin Electrns, Inc.	203-265-3134
FL	Fort Lauderdale, Nu Horizons	305-735-2555
FL	Ft. Lauderdale, Time Elctrns	800-331-7010
FL	Lake Mary, Milgray/Florida	407-321-2555
FL	Miami, All American Semiconductor	305-621-8282
FL	Orlando, Time Electrns	800-824-6598
FL	Sunrise, All American Semiconductor	305-572-7999
GA	Atlanta, Jan Dvcs	404-876-1421
GA	Norcross, Nu Horizons	404-416-8666
GA	Norcross, Milgray/Atlanta	404-446-9777
GA	Norcross, Time Electrns	800-824-6598
IL	Palatine, Milgray/Chicago	708-202-1900
IL	Rosemont, Advent Electrns	708-297-6200
IL	Schaumburg, Time Electrns	708-303-3000

IN	Indianapolis, Advent Electrns	317-872-4910
IA	Cedar Rapids, Advent Electrns	319-363-0221
KS	Overland Park, Milgray/Kansas City	913-236-8800
MD	Baltimore, Resco/Baltimore	301-931-8200
MD	Beltsville, Resco/Washington	301-937-9100
MD	Columbia, Nu Horizons	410-995-6330
MD	Columbia, Milgray/Washington	301-621-8169
MD	Columbia, Time Electrns	301-964-3090
MA	Melrose, Jan Dvcs Inc	617-662-3901
MA	Needham, Cronin Electrns, Inc.	617-449-5000
MA	Peabody, Time Electrns	508-532-9900
MA	Wakefield, Nu Horizons	617-246-4442
MA	Wilmington, Milgray/New England	508-657-5900
MI	Farmington Hills, Advent Electrns	313-477-1650
MN	Eden Prairie, All American	612-944-2151
MN	Edina, Time Electrns	612-830-1252
MO	Manchester, Time Electrns	314-391-6444
NH	Manchester, Cronin Electrns, Inc.	603-624-0105
NJ	Elmwood Pk, Phase I Tech	201-791-2990
NJ	Marlton, Milgray/Delaware Valley	609-983-5010
NJ	Marlton, Nu Horizons Electrns	609-596-1833
NJ	Marlton, Time Electrns	609-596-6700
NJ	Parsippany, Milgray/New Jersey	201-335-1766
NJ	Pine Brook, Nu Horizons Electrns	201-882-8300
NJ	West Berlin, GCI Corp.	609-768-6767
NY	Amityville, Nu Horizons	516-226-6000
NY	Deer Park, Phase I Technology	516-254-2600
NY	E. Rochester, Nu Horizons	716-292-0777
NY	Farmingdale, Milgray/New York	516-420-9800
NY	Hauppauge, Time Electrns	516-273-0100
NY	Pittsford, Milgray/Upstate New York	716-381-9700
NY	Ronkonkoma, All American	516-981-3935
NC	Raleigh, Milgray/Raleigh	919-790-8094
NC	Raleigh, Time Electrns	800-824-6598
OH	Cleveland, Milgray/Cleveland	216-447-1520
OH	Columbus, Time Electrns	614-794-3301
OR	Beaverton, Insight Elctrns	503-644-3300
OR	Portland, Time Electrns	503-684-3782
TX	Austin, Insight Electrns, Inc.	512-331-5887
TX	Austin, Time Electrns	512-339-3054
TX	Dallas, Milgray/Dallas	214-248-1603
TX	Houston, Time Electrns	713-530-0800
TX	Richardson, All American	214-231-5300
TX	Richardson, Insight Electrns,Inc.	214-783-0800
TX	Richardson, Time Electrns	214-644-4644
TX	Stafford, Milgray/Houston	713-240-5360
TX	Sugarland, Insight Elctrns, Inc	713-448-0800
UT	Murray, Milgray/Utah	801-261-2999
UT	Salt Lake City, Added Value	801-975-9500
UT	West Valley, Time Electrns	801-973-8494
WA	Kirkland, Time Elctrns	206-820-1525
WA	Kirkland, Insight Electrns	206-820-8100
WI	Mukwonago, Advent Elctrns	414-549-9035
Can	Alberta, Calgary, ITT Multicomponents	403-273-2780
Can	Alberta, Edmonton, ITT Multicomponents	403-436-9555
Can	British Columbia, Burnaby, ITT Multicomponents	604-421-6222
Can	Manitoba,Winnipeg, ITT Multicomponents	204-786-8401
Can	Ontario, Concord, ITT Multicomponents	416-736-1144
Can	Ontario, Mississauga, Milgray/Toronto	416-678-0958
Can	Ontario, Nepean, ITT Multicomponents	613-596-6980
Can	Quebec, St. Laurent, ITT Multicomponents	514-335-7697

ASI, Cadence Design Systems, Inc., 1505 Commerce Ave., Brookfield, Wisconsin 53045, Tel: 414-784-6400

AVASEM CORPORATION, 1271 Parkmoor Avenue, San Jose, California 95126, Tel: 408-297-1201, FAX: 408-925-9460

Sales Office & Representatives

AL	Huntsville, Elcom	205-830-4001
CA	Los Gatos, Martin Fletcher (Australia)	408-356-2418
CA	Mountain View, Nexus Mfgs Reps.	415-691-1100
CA	Santa Clara, Rymex Int'l Corp.	408-296-6626
CA	Tustin, RTS	714-730-9561
CO	Wheat Ridge, Waugaman Assoc. Inc.	303-423-1020
CT	Collinsville, Dynamic Sales of New England	203-693-6567
FL	Altamonte Springs, CM Mktg, Inc.	407-682-7709
FL	Clearwater, CM Mktg, Inc.	813-443-6390
FL	Ft. Lauderville, CM Mktg, Inc.	305-973-9373
GA	Norcross, Elcom	404-447-8200
IL	Arlington Heights, KMA Sales	708-398-5300
IN	Carmel, Technology Mktg Corp	317-844-8462
IN	Ft. Wayne, Technology Mktg Corp.	219-432-5553
IN	Kokomo, Technology Mktg Corp.	317-459-5152
KS	Louisville, Technology Mktg Corp.	502-893-1377
MA	Burlington, Dynamic Sales of New England	617-272-5676
MI	Bloomfield Hills, Enco Mktg, Inc.	313-338-8600
MN	Prior Lake, Gleason Assoc. Inc.	612-447-7020
NJ	Fairfield, Metro Logic	201-575-5585
ND	Portland, Electrn Engnr Sales	503-639-3978
OH	Centerville, Technology Mktg Corp.	502-435-8641
OH	Middleburg Heights, Technology Mktg Corp.	216-234-1202
PA	Trevose, Omega Electrn Sales, Inc.	215-244-4000
TX	Austin, Quad State Sales & Mktg	512-338-2125
TX	Dallas, Quad State Sales & Mktg	214-669-8567
TX	Houston, Quad State Sales & Mktg	713-893-8585
UT	Salt Lake City, Waugaman Assoc. Inc.	801-261-0802
VT	Granitville, Dynamic Sales of New England	802-426-4223
WA	Redmond, Electrn Engnr Sales	206-883-3374
WI	Milwaukee, KMA Sales	414-259-1771
Intl	Germany, Munchen, Neutron	011-49-89-5212861
Intl	Hong Kong, Kowloon, Sun On City	011-852-751-1623
Intl	Hong Kong, Kwai Chung, Electrocon Products, LTD.	011-852-416022
Intl	Japan, Chuo-Ku, Osaka, Nichimen Electrn Comps Corp.	011-81-6-223-5570
Intl	Korea, Seoul, Acetronix	011-82-2-796-4561
Intl	Singapore, Serial System Mktg	011-65-2938830
Intl	Taiwan, Taipei Hsien ROC, Princeton Technology Corp.	011-886-2-9178856

BENCHMARQ MICROELECTRONICS, 2611 Westgrove, Suite 109, Carrollton, Texas 75006, Tel: 214-407-0011, FAX: 214-407-9845

Sales Office & Representatives

AL	Daphne, Interep Assoc	205-621-1036
AL	Huntsville, Interep Assoc	205-881-1096
AZ	Scottsdale, Aztech Comp Sales	602-991-6300
CA	Irvine, Benchmarq (Western Area)	714-551-8402
CA	Los Angeles, Harper and Strong	310-424-3030
CA	San Diego, Addem	619-729-9216
CA	Santa Clara, Criterion Sales Inc.	408-988-6300
CO	Denver, Straube Assoc	303-426-0890
CT	Cheshire, ConnTech Sales	203-272-1277
FL	Ft. Lauderdale, Dyne-A-Mark	305-485-3500
FL	Maitland, Dyne-A-Mark	407-660-1661
FL	Palm Bay, Dyne-A-Mark	407-725-7470
GA	Norcross, Interep Assoc	404-449-8680
ID	Meridian, Intermountain Tech Mktg	208-888-6071
IL	Chicago, Micro Sales, Inc.	708-285-1000
IN	Fort Wayne, M/S Sales & Assocs., Inc.	219-436-3023
IA	Cedar Rapids, M.I.N.K. Assocs.	319-393-0373
KS	Overland Park, M.I.N.K. Assocs	913-341-8309
MD	Columbia, Avtek Assocs., Inc	410-740-5100
MA	Boston, ProComp Assoc Inc	508-858-0100
MI	Livonia, Giesting & Assocs	313-478-8106
MN	Minneapolis, Vector Comp Sales	612-631-1334
MO	Bridgeton, M.I.N.K. Assocs., Inc	314-291-5454
NJ	Cherry Hill, Tritek Sales Inc.	609-667-0200
NJ	Fairfield, Metro Logic Corp	201-575-5585
NY	Binghamton, Empire Tech Assoc	607-785-3865
NY	Kingston, Empire Tech Assoc	914-339-7139
NY	Pt. Jefferson, Benchmarq (Eastern Area)	516-331-3999
NY	Rochester, Empire Tech Assoc	716-381-8500
NY	Skaneateles, Empire Tech Assoc	315-685-5703
NC	Charlotte, Quantum Mktg	704-523-8822
NC	Raleigh, Quantum Mktg	919-846-5728
OH	Cincinnati, Giesting & Assocs	513-385-1105
OR	Beaverton, Comps West Inc	503-642-9110
PA	Pittsburgh, Giesting & Assocs	412-828-3553
TN	Greenville, Interep Assoc	615-639-3491
TX	Austin, OM Assocs., Inc	512-794-9971
TX	Dallas, OM Assocs., Inc	214-690-6746
TX	Dallas, Benchmarq (Hdqts)	214-407-0011
TX	Houston, OM Assocs., Inc	713-789-4426
UT	Salt Lake City, Straube Assoc	801-263-2640
WA	Redmond, Comps West Inc	206-885-5880
WI	Waukesha, Micro Sales, Inc.	414-786-1403
Can	B.C., Burnaby, Electro Source, Inc	604-435-2533
Can	Ont., Kanata, Vitel Electrns	613-592-0090
Can	Ont., Mississauga, Vitel Electrns	416-564-9720
Can	Que., Lachine, Vitel Electrns	514-636-5951
Intl	Australia, Victoria, DCS Australasia Pty Ltd	61-3-878-0344
Intl	Austria, Wien, Bacher Elctrns	43-1-81-602-0
Intl	Belgium, Halle, Tekelec Belgium N.V.	32-2-360-1288
Intl	Denmark, Brondby, Ditz Schweitzer A-S	45-42-45-30-44
Intl	Finland, Helsinki, Fintronic Ab	358-0-887-331
Intl	France, Rungis Cedex, Newtek S.A.	33-1-4687-2200
Intl	Germany, Munchen, Tekelec Airtronic GmbH	49-89-51640
Intl	Hong Kong, Kwai Fong, Memec Asia Pacific Ltd	852-410-2760
Intl	India, Bangalore, Spectra Innovations	91-812-588323
Intl	India, Bombay, Spectra Innovations	91-22-275560
Intl	India, New Delhi, Spectra Innovations	91-11-7525341
Intl	Israel, Tel Aviv, Telsys Ltd	972-3-492001-11
Intl	Italy, Milano, Newtek Italia SpA	39-2-33-10-53-08
Intl	Japan, Yokohama City, Macnica	81-45-939-6166
Intl	Korea, Seoul, ENC Korea	82-2-579-3330
Intl	Netherlands, Zoetermeer, Tekelec Airtronic B.V.	31-0-79-310100
Intl	Norway, Skedsmokorset, Nord Comp Norway AS	47-63-879330
Intl	S. Africa, Lenasia, KH Distributors cc	2711-854-5011
Intl	Singapore, Desner Elctrns	65-28-51-566
Intl	Spain, Madrid, Anatronic S.A.	34-1-542-4455
Intl	Switzerland, Langenthal, Memotec AG	41-69-281122
Intl	Taiwan, Taipei, Prospect Technology	886-2-820-5353
Intl	U.K., Reading Berks, Sequoia Technology Ltd	44-734-311822

Distributors

AL	Huntsville, Marshall Inds	205-881-9235
AL	Huntsville, Nu Horizons Elctrns Corp	205-722-9330
AL	Huntsville, Arrow Electrns	205-837-6955
AZ	Phoenix, Marshall Inds	602-496-0290
AZ	Phoenix, Wyle Labs	602-437-2088
AZ	Tempe, Arrow Electrns	602-431-0030
AZ	Tuscon, Marshall Inds	602-790-5887
CA	Calabassas, Wyle Labs	818-880-9000
CA	Calabassas, Marshall Inds	818-878-7065
CA	Calabassas, Arrow Electrns	818-880-9686
CA	Chatsworth, Marshall Inds	818-407-4100
CA	El Monte, Marshall Inds (Corporate Off.)	818-307-6000
CA	El Segundo, Wyle Labs	213-322-1763
CA	Fremont, Arrow Electrns	510-490-9477
CA	Irvine, Marshall Inds	714-458-5301
CA	Irvine, Wyle Labs	714-863-9953
CA	Irvine, Arrow Electrns	714-587-0404
CA	Rancho Cordova, Marshall Inds	916-635-9700
CA	Sacramento, Wyle Labs	916-638-5282
CA	Sacramento, Marshall Inds	916-635-9700
CA	San Diego, Marshall Inds	619-578-9600
CA	San Diego, Wyle Labs	619-565-9171
CA	San Diego, Arrow Electrns	619-565-4800
CA	San Francisco, Marshall Inds	408-942-4600
CA	San Jose, Arrow Electrns	408-441-9700
CA	Santa Clara, Wyle Labs	408-727-2500
CO	Denver, Wyle Labs	303-457-9953
CO	Denver, Marshall Inds	303-451-8383
CO	Englewood, Arrow Electrns	303-799-0258
CO	Thornton, Marshall Inds	303-451-8383
CT	Connecticut, Marshall Inds	203-265-3822
CT	Wallingford, Arrow Electrns	203-265-7741
FL	Altamonte Springs, Marshall Inds	407-767-8585
FL	Altamonte Springs, Vantage Comps, Inc	407-682-1199

FL	Deerfield Bch, Vantage Comps, Inc	305-429-1001
FL	Deerfield Beach, Arrow Electrns	305-429-8200
FL	Ft Lauderdale, Marshall Inds	305-977-4880
FL	Ft Lauderdale, Nu Horizons Elctrns Corp	305-735-2555
FL	Lake Mary, Arrow Electrns	407-333-9300
FL	St Petersburg, Marshall Inds	813-573-1399
GA	Duluth, Arrow Electrns	404-497-1300
GA	Norcross, Marshall Inds	404-923-5750
GA	Norcross, Nu Horizons Elctrns Corp	404-416-8666
IL	Itasca, Arrow Electrns	708-250-0500
IL	Schaumburg, Marshall Inds	708-490-0155
IN	Indianapolis, Marshall Inds	317-297-0483
IN	Indianapolis, Arrow Electrns	317-299-2071
IA	Cedar Rapids, Arrow Electrns	319-395-7230
KS	Lenexa, Marshall Inds	913-492-3121
KS	Lenexa, Arrow Electrns	913-541-9542
MD	Columbia, Vantage Comps, Inc	301-621-8555
MD	Columbia, Nu Horizons Elctrns Corp	410-995-6330
MD	Columbia, Arrow Electrns	301-596-7800
MD	Silver Springs, Marshall Inds	301-622-1118
MA	Andover, Vantage Comps, Inc	508-667-2400
MA	Boston, Wyle Labs	617-272-7300
MA	Wakefield, Nu Horizons Elctrns Corp	617-246-4442
MA	Wilmington, Marshall Inds	508-658-0810
MA	Wilmington, Arrow Electrns	508-658-0900
MI	Livonia, Marshall Inds	313-525-5850
MI	Livonia, Arrow Electrns	313-462-2290
MN	Eden Prairie, Arrow Electrns	612-941-5280
MN	Plymouth, Marshall Inds	612-559-2211
MO	Bridgeton, Marshall Inds	314-291-4650
MO	St Louis, Arrow Electrns	314-567-6888
NJ	Clifton, Vantage Comps, Inc	201-777-4100
NJ	Fairfield, Marshall Inds	201-882-0320
NJ	Marlton, Nu Horizons Elctrns Corp	609-596-1833
NJ	Marlton, Arrow Electrns	609-596-8000
NJ	Mt. Laurel, Marshall Inds	609-234-9100
NJ	Pine Brook, Nu Horizons Elctrns Corp	201-882-8300
NJ	Pine Brook, Arrow Electrns	201-227-7880
NY	Amityville, Nu Horizons Elctrns Corp	516-226-6000
NY	Binghamton, Marshall Inds	607-785-2345
NY	Hauppauge, Marshall Inds	516-273-2424
NY	Hauppauge, Arrow Electrns	516-231-1000
NY	Rochester, Marshall Inds	716-235-7620
NY	Rochester, Nu Horizons Elctrns Corp	716-292-0777
NY	Rochester, Arrow Electrns	716-427-0300
NY	Smithtown, Vantage Comps, Inc	516-543-2000
NC	Raleigh, Marshall Inds	919-878-9882
NC	Raleigh, Arrow Electrns	919-876-3132
OH	Centerville, Arrow Electrns	513-435-5563
OH	Dayton, Marshall Inds	513-898-4480
OH	Solon, Marshall Inds	216-248-1788
OH	Solon, Arrow Electrns	216-248-3990
OK	Tulsa, Arrow Electrns	918-252-7537
OR	Beaverton, Marshall Inds	503-644-5050
OR	Beaverton, Arrow Electrns	503-629-8090
OR	Portland, Wyle Labs	503-643-7900
PA	Pittsburgh, Marshall Inds	412-788-0441
PA	Pittsburgh, Arrow Electrns	412-963-6807
TX	Austin, Marshall Inds	512-837-1991
TX	Austin, Wyle Labs	512-345-8853
TX	Austin, Arrow Electrns	512-835-4180
TX	Carrollton, Marshall Inds	214-705-0600
TX	Carrollton, Arrow Electrns	214-380-6464
TX	Dallas, Wyle Labs	214-235-9953
TX	El Paso, Marshall Inds	915-593-0706
TX	Houston, Marshall Inds	713-895-9200
TX	Houston, Wyle Labs	713-879-9953
TX	Houston, Arrow Electrns	713-530-4700
TX	San Antonio, Marshall Inds	210-734-5100
UT	Salt Lake City, Marshall Inds	801-485-1551
UT	Salt Lake City, Wyle Labs	801-974-9953
UT	Salt Lake City, Arrow Electrns	801-973-6913
WA	Bellevue, Arrow Electrns	206-643-9992
WA	Bothell, Marshall Inds	206-488-5747
WA	Seattle, Wyle Labs	206-881-1150
WI	Brookfield, Arrow Electrns	414-792-0150
WI	Waukesha, Marshall Inds	414-797-8400
Can	Alb., Calgary, Arrow Electrns	403-250-1690
Can	B.C., Burnaby, Arrow Electrns	604-421-2333
Can	Ont., Belleville, Arrow Electrns	613-967-6681
Can	Ont., Brampton, G.S. Marshall Co.	416-458-8046
Can	Ont., Mississuaga, Arrow Electrns	416-670-7769
Can	Ont., Nepean, Arrow Electrns	613-226-6903
Can	Ont., Ottawa, G.S. Marshall Co.	613-564-0166
Can	Que., Dorval, Arrow Electrns	514-421-7411
Can	Que,, Montreal, G.S.Marshall Co.	514-694-8142
Can	Western Canada, G.S. Marshall	800-366-2356

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Sales Office & Representatives

AL	Huntsville, Group 2000 Sls	205-536-2000
AZ	Phoenix, Oasis Sales	602-277-2714
CA	Calabasas, Centaur Corp	818-591-1655
CA	Fallbrook, Gary Chilcote Assoc.	619-728-7678
CA	Irvine, Centaur Corp	714-261-2123
CA	San Diego, Brooktree Corp.	619-535-3463
CA	Santa Clara, Quorum	408-980-0812
CA	Santa Clara, Brooktree Corp	408-492-9151
CO	Boulder, Brooktree Corp/Base 2	303-494-4484
CO	Littleton, Lange Sls Inc	303-795-3600
CT	Cheshire, ConnTech Sls	203-272-1277
FL	Altamonte Springs, SEC	407-830-8444
FL	Deerfield Bch, SEC	305-426-4601
FL	Orlando, Chip Supply	407-298-7100
GA	Norcross, Group 2000 Sls	404-729-1889
ID	Boise, Lange Sls Inc	208-323-0713
IL	Elk Grove Village, Oasis Sales	708-640-1850
IL	Schaumburg, Brooktree Corp.	708-397-2222
IN	Ft. Wayne, Corrao Marsh inc	219-482-2725
IN	Greenfield, Corrao Marsh Inc	317-432-4446
IA	Cedar Rapids, Stan Clothier Co.	319-393-1576
KS	Lenexa, Stan Clothier Co.	913-492-2124
MD	Gaithersburg, Deltatronics	301-253-0615
MA	Westford, The Nashoba Grp	508-692-7503
MI	Brighton, A.P. Assocs.	313-229-6550
MN	Eden Prairie, Stan Clothier Co.	612-944-3456
MO	St. Charles, Stan Clothier Co.	314-928-8078
NY	Buffalo, Quality Comps	716-837-5430
NY	Commack, ERA	516-543-0510
NY	Manilus, Quality Comps	315-682-8885
NY	Rochester, Quality Comps	716-342-7229
NC	Cary, Group 2000 Sls	919-481-1530
NC	Wilmington, Brooktree Corp.	919-256-8384
OH	Dayton, Lyons	513-278-0714
OH	Richfield, Lyons	216-659-9224
OH	Westerville, Lyons	614-278-0714
OR	Portland, Westerberg & Assocs.	503-620-1931
PA	Blue Bell, Deltatronics	215-641-9930
TX	Austin, OM Assoc.	512-794-9971
TX	Dallas, Brooktree Corp.	214-490-1945
TX	Houston, OM Assoc.	713-789-4426
TX	Richardson, OM Assoc.	214-690-6746
UT	Salt Lake City, Lange Sls Inc	801-487-0843
VA	Alexandria, Deltatronics	703-971-1733
WA	Bellevue, Westerberg & Assocs.	206-453-8881
WI	Brookfield, Oasis Sales	414-782-6660
Can	Ont. Ottawa, Dynasty Comps	613-596-9800
Intl	Australia, Melbourne, Zatek Comps	61-3763-8899
Intl	Australia, Sydney, Zatek Comps	61-2874-0122
Intl	Austria, Muehlgasse, CODICO	43-222-862-428
Intl	Bayshore, EIM Intl Elctrns Inc	516-243-1400
Intl	Belguim, Kontich, Alcom Elctrns B.V.B.A.	32-3-458-30-33
Intl	Denmark, Gladsaxevej, Scansupply	45-3966-5090
Intl	Finland, Helsinki, Comodo Oy	358-0-351-5100
Intl	France, Sevres Cedex, Tekelec Airtronic	331-46-23-2229
Intl	Germany, Munich, Brooktree Corp.	49-89-937520
Intl	Germany, Munich, Tekelec Airtronic GmbH	49-89-51-6410
Intl	Hong Kong, Brooktree Corp	852-8130699
Intl	Hong Kong, Tsumshatsui, Lestina International, Ltd.	852-735-1736
Intl	India, Bombay, Oriole Services	91-22-512-2973
Intl	Ireland, Limerick, MEMEC Ireland	353-61-411-842
Intl	Italy, Milan, Comprel s.p.a.	3936-2-553-991
Intl	Japan, Osaka-shi, H.Y. Assocs	81-06-266-0611
Intl	Japan, Tokyo, Brooktree Corp.	81-3-3588-0414
Intl	Japan, Tokyo, H.Y. Assocs.	81-33-929-7111
Intl	Japan, Tokyo, Nissei Electrns	81-33-504-7921
Intl	Korea, Seoul, Kortronics Enterprise	82-2-523-5233
Intl	Norway, Oslo, Scandcomp	47-22-500-650
Intl	Singapore, Desner Electrns	65-285-1566
Intl	Spain, Barcelona, Semiconductores,S.A.	34-3-217-2340
Intl	Spain, Madrid, Semiconductores	34-1-742-2313
Intl	Sweden, Hagersten, Martinsson Electronik AB	46-8-744-0300
Intl	Switzerland, Geneva, Abalec AG	41-22-757-2902
Intl	Switzerland, Schlieren, Abalec AG	41-1-730-04-55
Intl	Taiwan,Taipei, Sertek	886-2-501-0055
Intl	Taiwan,Taipei, Tonsam Corp	886-02-651-0011
Intl	The Netherlands, Alcom	31-10-451-9533
Intl	United Kingdom, Thame, Oxfordshire, Brooktree Ltd.	44-844-261989
Intl	United Kingdom, Thame, Oxfordshire, Thame Comps Ltd.	44-84-426-1188
PR	San Juan, ETS, Inc	809-798-1300

Distributors

AL	Huntsville, Marshall	205-881-9235
AL	Huntsville, Hamilton/Avnet	205-837-7211
AZ	Phoenix, Marshall	602-496-0290
AZ	Tempe, Anthem	602-966-6600
AZ	Tempe, Hamilton/Avnet	602-902-4700
CA	Calabasas, Marshall	818-878-7000
CA	Chatsworth, Anthem	818-700-1000
CA	Costa Mesa, Hamilton/Avnet	714-641-4100
CA	Culver City, Hamilton/Avnet (Corporate)	310-558-2065
CA	El Monte, Marshall (Corporate)	818-307-6000
CA	Irvine, Anthem	714-768-4444
CA	Irvine, Marshall	714-859-5050
CA	Milpitas, Marshall	408-942-4600
CA	Rancho Cordova, Marshall	916-635-9700
CA	Rocklin, Anthem	916-624-9744
CA	Roseville, Hamilton/Avnet	916-781-6614
CA	San Diego, Anthem	619-453-9005
CA	San Diego, Marshall	619-578-9600
CA	San Diego, Hamilton/Avnet	619-571-5740
CA	San Jose, Anthem (Corporate)	408-453-1200
CA	Sunnyvale, Hamilton/Avnet	408-743-3300
CA	Woodland Hills, Hamilton/Avnet	818-594-8242
CO	Englewood, Anthem	303-790-4500
CO	Englewood, Hamilton/Avnet	303-799-7800
CO	Thornton, Marshall	303-451-8383
CT	Danbury, Hamilton/Avnet	203-743-9799
CT	Wallingford, Marshall	203-265-3822
CT	Waterbury, Anthem	203-575-1575
FL	Altamonte Springs, Marshall	407-767-8686
FL	Clearwater, Hamilton/Avnet	813-530-0644
FL	Ft Lauderdale, Marshall	305-977-4880
FL	Ft Lauderdale, Hamilton/Avnet	305-733-6300
FL	St.Petersburg, Marshall	813-573-1399
FL	Winter Park, Hamilton/Avnet	407-657-3300
GA	Duluth, Hamilton/Avnet	404-623-5475
GA	Norcross, Marshall	404-923-5750
IL	Bensenville, Hamilton/Avnet	708-860-7700
IL	Schaumburg, Anthem	708-884-0200
IL	Schaumburg, Marshall	708-490-0155
IN	Carmel, Hamilton/Avnet	317-844-9533
IN	Indianapolis, Marshall	317-297-0483
IA	Cedar Rapids, Hamilton/Avnet	319-393-0033
KS	Lenexa, Marshall	913-492-3121
KS	Lenexa, Hamilton/Avnet	913-888-8900
MD	Columbia, Anthem	410-995-6640
MD	Columbia, Hamilton/Avnet	410-995-3560
MD	Silver Spring, Marshall	301-622-1118
MA	Peabody, Hamilton/Avnet	508-532-3701
MA	Wilmington, Anthem	508-657-5170
MA	Wilmington, Marshall	508-658-0810
MI	Livonia, Marshall	313-525-5850
MI	Novi, Hamilton/Avnet	313-347-4271
MN	Eden Prairie, Anthem	612-944-5454
MN	Minnetonka, Hamilton/Avnet	612-932-0600
MN	Plymouth, Marshall	612-559-2211
MO	Bridgeton, Marshall	314-291-4650
MO	Chesterfield, Hamilton/Avnet	314-537-1600
NJ	Cherry Hill, Hamilton/Avnet	609-751-2539
NJ	Fairfield, Marshall	201-882-0320
NJ	Mt. Laurel, Marshall	609-234-9100
NJ	Parsippany, Hamilton/Avnet	201-575-3490
NJ	Pine Brook, Anthem	201-227-7960
NM	Albuquerque, Alliance Electrns	505-292-3360
NM	Albuquerque, Hamilton/Avnet	505-828-1058
NY	Commack, Anthem	516-493-2225
NY	Endicott, Marshall	607-785-2345
NY	Hauppauge, Marshall	516-273-2424
NY	Hauppauge, Hamilton/Avnet	516-434-7420
NY	N. Syracuse, Hamilton/Avnet	315-453-4000
NY	Rochester, Hamilton/Avnet	716-475-9130

NY	Rochester, Marshall	716-235-7620
NC	Raleigh, Marshall	919-878-9882
NC	Raleigh, Hamilton/Avnet	919-878-0819
OH	Columbus, Hamilton/Avnet	614-882-7389
OH	Dayton, Marshall	513-898-4480
OH	Dayton, Hamilton/Avnet	513-439-6721
OH	Independence, Hamilton/Avnet	216-573-7400
OH	Solon, Marshall	216-248-1788
OK	Tulsa, Hamilton/Avnet	918-252-7297
OR	Beaverton, Marshall	503-644-5050
OR	Beaverton, Anthem	503-643-1114
OR	Beaverton, Hamilton/Avnet	503-526-6200
PA	Horsham, Anthem	215-443-5150
PA	Mars, Hamilton/Avnet	412-772-1881
TX	Austin, Marshall	512-837-1991
TX	Austin, Hamilton/Avnet	512-832-4306
TX	Dallas, Hamilton/Avnet	214-308-8137
TX	Houston, Marshall	713-467-1666
TX	Houston, Hamilton/Avnet	713-861-8517
TX	Richardson, Marshall	214-705-0600
TX	Richardson, Anthem	214-238-7100
UT	Salt Lake City, Anthem	801-973-8555
UT	Salt Lake City, Marshall	801-973-2288
UT	Salt Lake City, Hamilton/Avnet	801-972-2800
WA	Bothell, Marshall	206-486-5747
WA	Bothell, Anthem	206-483-7242
WA	Redmond, Hamilton/Avnet	206-881-6697
WI	Waukesha, Marshall	414-797-8400
WI	Waukesha, Hamilton/Avnet	414-784-4510
Can	B.C. Burnaby, Hamilton/Avnet	604-420-4101
Can	Ont. Mississauga, Hamilton/Avnet	416-795-3832
Can	Ont., Nepean, Hamilton/Avnet	613-226-1700
Can	Ontario, Brampton, Marshall	416-458-8046
Can	Que., Pointe Claire, Marshall	514-694-8142
Can	Que., St. Laurent, Hamilton/Avnet	514-335-1000
Intl	Australia, Melbourne, Zatek Comps	61-3763-8899
Intl	Australia, Sydney, Zatek Comps	61-2874-0122
Intl	Austria, Muehlgasse, CODICO	43-222-862-428
Intl	Bayshore, EIM Intl Elctrns Inc	516-243-1400
Intl	Belguim, Kontich, Alcom Elctrns B.V.B.A.	32-3-458-30-33
Intl	Denmark, Gladsaxevej, Scansupply A/S	45-3966-5090
Intl	Finland, Helsinki, Comodo Oy	358-0-351-5100
Intl	France, Sevres Cedex, Tekelec Airtronic	331-46-23-2229
Intl	Germany, Munich, Tekelec Airtronic GmbH	49-89-51-6410
Intl	Hong Kong, Tsumhatsui, Lestina International, Ltd.	852-735-1736
Intl	India, Bombay, Oriole Services	91-22-512-2973
Intl	Ireland, Limerick, MEMEC Ireland	353-61-411-842
Intl	Italy, Milan, Comprel s.p.a.	3936-2-553-991
Intl	Japan, Osaka-shi, H.Y. Assocs	81-6-266-0611
Intl	Japan, Tokyo, H.Y. Assoc.	81-33-929-7111
Intl	Japan, Tokyo, Nissei Electrns	81-33-504-7921
Intl	Korea, Seoul, Kortronics Enterprise	82-02-523-5233
Intl	Norway, Oslo, Scandcomp	47-22-500-650
Intl	Singapore, Desner Electrns	65-285-1566
Intl	Spain, Barcelona, Semiconductores,S.A.	34-3-217-2340
Intl	Spain, Madrid, Semiconductores	34-1-742-2313
Intl	Sweden, Hagersten, Martinsson Electrnk AB	46-8-744-0300
Intl	Switzerland, Geneva, Abalec AG	41-22-757-2902
Intl	Switzerland, Schlieren, Abalec AG	41-1-730-04-55
Intl	Taiwan, Taipei, Tonsam Corp	886-02-651-0011
Intl	Taiwan,Taipei, Sertek	886-2-501-0055
Intl	The Netherlands, Alcom	31-10-451-9533
Intl	United Kingdom, Thame, Oxfordshire, Thame Comps Ltd.	44-84-426-1188
PR	Rio Piedras, Hamilton/Avnet	809-764-1199

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Sales Office & Representatives

AL	Huntsville, Rep, Inc	205-881-9270
AZ	Scottsdale, Summit Sls	602-998-4850
CA	Agoura Hills, Burr-Brown	818-991-8544
CA	Santa Ana, Burr-Brown	714-835-0712
CA	Santa Clara, I Squared, Inc	408-988-3400
CO	Ft. Collins, Sales Technlg, Inc	303-530-9409
FL	Altamonte Springs, VG Sls Co., Inc	407-831-8688
FL	Ft. Lauderdale, VG Sls Co., Inc	305-938-4333
FL	Largo, VG Sls Co., Inc	813-536-7787
GA	Tucker, Rep, Inc	404-938-4358
IL	Rolling Meadows, Sumer, Inc	708-991-8500
IN	Indianapolis, LM Devoe Co	317-842-3245
IA	Cedar Rapids, Rep Assocs Corp	319-373-0152
MA	Burlington, Burr-Brown	617-229-0300
MI	Milford, Electrn Comp Sls, Inc	313-360-3790
MN	Bloomington, Electrn Sls Agency, Inc	612-884-8291
MO	Bridgeton, Hitec Central, Inc	314-291-5920
MO	Independence, Hitec Central, Inc	816-796-6684
MO	Rockville, Marktron, Inc	301-251-8990
NY	E. Syracuse, Elcom Sls Inc	315-685-8967
NY	Hicksville, J-Square Mktg	516-935-3200
NY	Pittsford, Elcom Sls Inc	716-385-1400
NC	Morrisville, Rep, Inc	919-469-9997
OH	Willoughby Hills, Versatron Inc	216-944-0082
PA	Hatboro, Delta Tech Sls	215-957-0600
TN	Jefferson City, Rep, Inc	615-475-4105
TX	Dallas, Burr-Brown	214-783-4555
TX	Houston, Development Tech Sls, Inc	713-988-6546
UT	Murray, Front Range Mktg	801-288-2500
WA	Federal Way, Wilson Elctrns Sls Team	206-946-8016
WI	Brookfield, Sumer, Inc	414-784-6641
Can	Alb., Calgary, Dynasty Comps	403-560-1212
Can	B.C., Vancouver, Dynasty Comps	604-657-4433
Can	Ont., Ottawa, Dynasty Comps	613-596-9800
Can	Ont., Toronto, Dynasty Comps	416-672-5977
Can	Que., Montreal, Dynasty Comps	514-843-1879
Intl	Australia, Victoria, Kenelec Pty Ltd	(61) 3-560-1011
Intl	Austria, Vienna, Burr-Brown Resch GmbH	(43) 1-602-63-71
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Intl	Brazil, Sao Paulo, Aplicacoes Electrnas Artimar	(55) 11 231 0277
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Intl	China, Wanchai, Schmidt & Co (H.K.) Ltd	(852) 5070222
Intl	Colombia, Bogota, Instrumentacion Ltda	(57) 1-6121313
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OR	Beaverton, Quest Mktg	503 641-7377
WA	Bellevue, Quest Mktg	206-747-9424

CONTROL DATA, Computer Systems and Services, P.O. Box 0, Minneapolis, Minnesota 55440, Tel: 612-853-8390

CONTROL DATA, Scientific Information Services, 8100-34th Ave. South, Minneapolis, Minnesota 55420, Tel: 612-853-3511

CORNES U.S.A. LTD., 9010 Miramar Road, Suite 100, San Diego, California 92126, Tel: 619-586-6200, FAX: 619-586-0529

Sales Office & Representatives

Intl	England, London, Cornes UK Ltd.	71-253-3744
Intl	Japan, Tokyo, Cornes & Co., Ltd.	03-272-5771

Distributors

CA	San Diego, Cornes USA Ltd	619-586-6200

CROSSPOINT SOLUTIONS, INC., 5000 Old Ironsides Drive, Santa Clara, California 95054, Tel: 408-988-1584, FAX: 408-980-9594

Sales Office & Representatives

AL	Huntsville, Beacon Elctrn Assocs	205-881-5031
AZ	Phoenix, Sun State Tech Sls	602-220-0595
CA	Irvine, Crosspoint Solutions, Inc	714-851-8590
CA	Mt. View, Nexus, Inc	415-691-1100
CA	Santa Clara, Crosspoint Solutions, Inc (H.Q)	408-988-1584
CA	Tustin, Dynarep, Inc	714-258-8002
CA	Woodland Hills, Dynarep, Inc	818-346-2200
CO	Boulder, Front Range Mktg	303-443-4780
CO	Littleton, Lange Sls	303-795-3600
CT	Guilford, S-J New England	203-458-7558
FL	Longwood, Beacon Elctrn Assocs	407-332-1940
FL	W. Palm Bch, Beacon Elctrn Assocs	407-966-4741
GA	Atlanta, Beacon Elctrn Assocs	404-256-9640
ID	Boise, Lange Sls	208-323-0713
IL	Rolling Meadows, Eagle Tech Sls	708-991-0700
IN	Kokomo, Skylines Sls	317-452-6500
MA	Burlington, New Tech Solutions, Inc	617-229-8888
MA	Concord, Crosspoint Solutions, Inc	508-287-0303
MN	Edina, GP Sls, Inc	612-831-2362
NJ	Mt. Laurel, S-J Mid-Atlantic, Inc	609-866-1234
NY	Rochester, Micro-Tech Mktg, Inc	315-458-5254
NY	Rockville Centre, S-J Assocs, Inc	516-536-4242
NC	Raleigh, Beacon Elctrn Assocs	919-787-0330
OH	Cincinnati, Applied Data Mgt	513-579-8108
SC	Greenville, Beacon Elctrn Assocs	803-297-7830
TN	Knoxville, Beacon Elctrn Assocs	615-691-0062
TX	Austin, Vielock Assocs	512-345-8498
TX	Houston, Vielock Assocs	713-974-3287
TX	Plano, Vielock Assocs	214-881-1940
UT	Salt Lake City, Lange Sls	801-487-0843
VA	Falls Church, S-J Chesapeake, Inc	703-533-2233
Can	Alb., Calgary, InTELaTECH Inc	403-230-3190
Can	Ont., Mississauga, InTELaTECH Inc	416-629-0082
Can	Ont., Nepean, InTELaTECH Inc	613-769-5618
Can	Que., Montreal, InTELaTECH Inc	514-369-1317

Distributors

Intl	Australia, Rydalmere, NSW, GEC Elctrns Div	61-02-638-1888
Intl	Austria, Vienna, Thomas NEUROTH GmbH	43-1-82-56-45
Intl	Denmark, Copenhagen, Exactec AS	45-31-19-10-22
Intl	France, Rungis Cedex, Misil	33-1-45-60-00-21
Intl	Germany, Munich, Tekelec Airtronic GmbH	49-089-5164-0
Intl	Hong Kong, Chai Wan, Synthesis Sys Design, Ltd	852-557-1102
Intl	Italy, Milan, EL. CO. MI	39-02-6196452
Intl	Japan, Tokyo, ASCII & Mitsui Co Semi Corp	81-03-3486-9188
Intl	Japan, Tokyo, Soliton Sys K.K.	81-03-3356-6310
Intl	Korea, Seoul, I&C Microsystems Co Ltd	82-02-577-9131

Intl	Norway, Oslo, Art Chip A/S	47-2-656
Intl	Switzerland, Langenthal, Memotec AG	41-63-28-11-22
Intl	U.K., England, AM&T	44-272-237594

CRYSTAL SEMICONDUCTOR CORP., 4210 S Industrial Dr., Austin, Texas 78744, Tel: 512-445-7222, FAX: 512-445-7581

Sales Office & Representatives

AL	Huntsville, Currie, Peak & Frazier, Inc	205-536-1506
AZ	Scottsdale, Western High Tech Mktg, Inc.	602-860-2702
CA	Fountain Valley, Bager Electrns	714-957-3367
CA	Mission Viejo, Crystal Semiconductor Corp.	714-348-8770
CA	Roseville, NORCOMP, Inc	916-782-8070
CA	San Diego, Earle Assoc, Inc.	619-278-5441
CA	San Jose, Crystal Semiconductor Corp.	408-437-7743
CA	Santa Clara, NORCOMP, Inc	408-727-7707
CA	Woodland Hills, Bager Electrns	818-712-0011
CO	Denver, Promo Tech	303-692-8484
FL	Orlando, Currie, Peak & Frazier, Inc	407-855-0843
GA	Duluth, Currie, Peak & Frazier, Inc	404-497-9404
IL	Itasca, Micro Sales Inc.	708-285-1000
IN	Carmel, TMC Elctrns	317-844-8462
IN	Ft. Wayne, TMC Elctrns	219-432-5553
IN	Kokomo, TMC Elctnrs	317-459-5152
IA	Cedar Rapids, Stan Clothier Co.	319-393-1576
KS	Olathe, Stan Clothier Co.	913-829-0073
KY	Louisville, TMC Elctrns	502-245-7411
MD	Severna Park, New Era Sales, Inc.	410-544-4100
MA	North Andover, Crystal Semiconductor Corp.	508-794-1194
MA	North Reading, Alpha-Omega Sales Corp.	508-664-1118
MI	Grand Rapids, J.M.J. & Assoc, Inc.	616-285-8887
MN	Plymouth, The Twist Co.	612-550-0922
MO	St.Charles, Stan Clothier Co.	314-928-8078
NJ	Cherry Hill, Vantage Sales Co.	609-424-6777
NJ	Fort Lee, Nexus Technology Sales	201-947-0151
NY	Ithaca, Bob Dean, Inc.	607-257-1111
NY	Wappingers Falls, Bob Dean, Inc.	914-297-6406
NC	Greensboro, Currie, Peak & Frazier, Inc	919-373-0380
NC	Raleigh, Crystal Semiconductor Corp.	919-846-4832
OH	Cincinnati, TMC Electrns	513-271-3860
OH	Middleburg Heights, TMC Electrns	216-885-5544
OR	Portland, Electrns Engnr Sales	503-639-3978
TX	Austin, Crystal Semiconductor Corp.	512-445-7222
TX	Austin, TL Maarketing, Inc.	512-837-7272
TX	Dallas, TL Mktg	214-490-9300
TX	Houston, TL Mktg, Inc.	713-587-8100
UT	Bountiful, Anderson Assoc	801-292-8991
VA	Charlottesville, New Era Sales, Inc.	804-979-2470
WA	Redmond, Electrn Engnr Sales	206-883-3374
WI	Brookfield, Micro Sales, Inc.	414-786-1403

Distributors

AL	Huntsville, Reptron Electrns	205-722-9500
AL	Huntsville, Nu Horizons Elctrns	205-722-9330
AZ	Tempe, Insight Electrns	602-829-1800
AZ	Tucson, Insight Electrns	602-792-1800
CA	Irvine, Insight Electrns	714-727-3291
CA	Los Angeles, Insight Electrns	213-466-1196
CA	San Diego, Insight Electrns	619-587-0471
CA	San Fernando Valley, Insight Electrns	818-707-2100
CA	San Gabriel, Insight Electrns	818-358-0389
CA	Sunnyvale, Insight Electrns	408-720-9222
CO	Aurora, Insight Elctrns	303-693-4256
FL	Fort Lauderdale, Nu Horizons Elctrns	305-735-2555
GA	Norcross, Nu Horizons Elctrns	404-416-8666
IL	Schaumburg, Reptron Electrns	708-882-1700
MD	Columbia, Nu-Horizons Electrns	410-995-6330
MA	Wilmington, North Star Electrns	508-657-5155
MI	Livonia, Reptron Electrns	313-525-2700
MN	Minnetonka, Reptron Electrns	612-938-0000
NJ	Marlton, Nu-Horizons Elctrns	609-596-1833
NJ	Mt. Laurel, Nu Horizons Elctrns	609-231-0900
NJ	Pine Brook, Nu-Horizons Electrns	201-882-8300
NY	North Amityville, Nu-Horizons Electrns	516-226-6000
NY	Rochester, Nu-Horizons Electrns	716-292-0777
NC	Raleigh, Reptron Electrns	919-870-5189
OH	Solon, Reptron Electrns	216-349-1415
OH	Worthington, Reptron Electrns	614-436-6675
OR	Beaverton, Insight Electrns	503-644-3300
TX	Austin, Insight Electrns	512-331-5887
TX	Ft. Worth, Insight Electrns	817-338-0800
TX	Richardson, Insight Electrns	214-783-0800
TX	Sugarland, Insight Electrns	713-448-0800
WA	Kirkland, Insight Electrns	206-820-8100
Can	British Columbia, Delta, Mirika Electrns	604-943-5020
Can	Ont., Mississauga, InTELaTECH inc	416-629-0082
Can	Ont., Nepean, InTELaTECH inc	613-769-5618
Can	Que., Montreal, InTELaTECH inc	514-630-6041
Intl	Australia, Riverwood, ACD Itronics	61-02-534-6200
Intl	Australia, Victoria, ACD Itronics Pegasus	61-03-762-7644
Intl	Austria, Wien, Hitronik GmbH.	43-0187-74199
Intl	Belgium, Kontich, Alcom Electrns BVBA	32-0345-83033
Intl	Denmark, Haunevej, Scansupply A/S	45-86-127788
Intl	Denmark, Soebord, Scansupply A/S	45-039-665090
Intl	Finland, Espoo, Oy Ferrado AB	358-0-5281
Intl	France, Claix, Newtek Sud-Est	33-076-985601
Intl	France, Rungis Cedex, Newtek S.A.	33-01468-72200
Intl	Germany, Hamburg, Atlantik Elektronik GmgH	49-040-241072
Intl	Germany, Munich, Atlantik Elektronik GmbH	49-089-8570000
Intl	Holland, Essebaan, Alcom Electrns BV	31-010-4519533
Intl	Hong Kong, CET Ltd.	852-520-0922
Intl	Isreal, Tel-Aviv, Telsys	972-03-492001
Intl	Italy, Cinisello, Balsamo, EBV Electronik SRL	39-02-66017111
Intl	Japan, Tokyo, Asahi Kasei Microsystems Co., Ltd.	81-03-320-2070
Intl	Korea, Seoul, Hanaro Corp.	82-02-516-1144
Intl	Malaysia, Penang, DCP M SDN BHD	604-281860
Intl	Norway, Hvalstad, Nortec Elctrns A/S	47-02-846210
Intl	Singapore, Dynamar Computer Products, Pte Ltd	65-281-3388
Intl	Spain, Madrid, Amitron SA	34-91-5420906
Intl	Sweden, Stockholm, Ab Gosta Backstrom	46-086541-080
Intl	Switzerland, Langenthal, Memotec AG	41-063-281-122
Intl	Taiwan ROC Taipei, Morrihan International Corp.	886-02-752-2200
Intl	Thailand, Bangkok, Dynamar Computer Sys	662-278-3690
Intl	United Kingdom, Reading, Sequoia Technology Ltd.	44-0734-311822
Intl	United Kingdom, Surrey, Crystal Semiconductor UK Ltd.	44-0276-685761

CUSTOM ARRAYS CORP., 525 Del Rey Ave., Sunnyvale, California 94086, Tel: 408-749-1166, TELEX: 5106005119

CYBERNETIC MICRO SYSTEMS, P.O. Box 3000, San Gregorio, California 94074, Tel: 415-726-3000, FAX: 415-726-3003

CYPRESS SEMICONDUCTOR CORP., 3901 North First Street, San Jose, California 95134, Tel: 408-943-2600, TELEX: 821032 CYPRESS SNJ UD, TWX: 910 997 0753, FAX: 408-943-2741

Sales Office & Representatives

AL	Huntsville, Giesting & Assocs	205-830-4554
AL	Huntsville, Cypress Semiconductor	205-721-9500
AZ	Scottsdale, Thom Luke Sales, Inc.	602-451-5400
CA	Calabase, Cypress Semiconductor	818-222-3800
CA	Irvine, Cypress Semiconductor	714-753-5800
CA	Mountain View, TAARCOM	415-960-1550
CA	San Diego, Cypress Semiconductor	619-755-1976
CA	San Jose, Cypress Semiconductor	408-943-2700
CO	Denver, Cypress Semiconductor	303-433-4889
CT	Danbury, HLM	203-791-1878
FL	Altamonte Springs, CM Mktg	407-682-7709
FL	Clearwater, CM Mktg	813-443-6390
FL	Ft. Lauderdale, CM Mktg	305-566-6386
FL	Orlando, Cypress Semiconductor	407-422-0734
FL	Tampa, Cypress Semiconductor	813-968-1504
GA	Duluth, Giesting & Assocs	404-476-0025
IL	Itasca, Micro Sales, Inc.	708-285-1000
IL	Palatine, Cypress Semiconductor	708-934-3144
IN	Carmel, Technology Mktg. Corp	317-844-8462
IN	Ft. Wayne, Technology Mktg. Corp	219-432-5553
IN	Kokomo, Technology Mktg Corp	317-459-5152
IA	Cedar Rapids, Midwest Tech. Sales	319-377-1688
KS	Goddard, Midwest Tech. Sales	316-794-8565
KS	Lenexa, Midwest Tech. Sales	913-888-5100
KY	Louisville, Technology Mktg. Corp	502-893-1377
MD	Columbia, Cypress Semiconductor	410-312-2911
MI	Canton, Techrep	313-981-1950
MN	Minnetonka, Cypress Semiconductor	612-935-7747
MO	Earth City, Midwest Tech Sales	314-298-8787
NH	Nashua, Cypress Semiconductor	603-891-2655
NJ	Morristown, Cypress Semiconductor	201-267-6773
NJ	Parsippany, HLM	201-263-1535
NM	Albuquerque, Techni-Source, Inc.	505-268-4232
NY	Endwell, Reagan/Compar	607-754-2171
NY	Hauppauge, Cypress Semiconductor	516-231-0238
NY	Northport, HLM	516-757-1606
NY	Poughkeepsie, Cypress Semiconductor	914-485-6375
NY	Rochester, Reagan/Compar	716-271-2230
NY	Syracuse, Reagan/Compar	315-432-8232
NC	Raleigh, Cypress Semiconductor	919-870-0880
OH	Dayton, KW Elect. Sales	513-890-2150
OH	Shaker Heights, KW Elect. Sales	216-491-9177
OR	Beaverton, Cypress Semiconductor	503-626-6622
OR	Beaverton, Northwest Mktg Assocs	503-620-0441
PA	Allison Park, KW Electrn Sales, Inc.	412-492-0777
PA	Broomall, L.D.Lowery	215-356-5300
PA	Trevose, Cypress Semiconductor	215-639-6663
TX	Austin, Cypress Semiconductor	512-502-3023
TX	Houston, Cypress Semiconductor	713-370-0221
TX	Richardson, Cypress Semiconductor	214-437-0496
UT	Salt Lake City, Sierra Tech Sales	801-566-9719
VA	Falls Church, Cypress Semiconductor	703-849-1733
WA	Bellevue, Northwest Mktg Assoc	206-455-5846
WI	Waukesha, Micro Sales Inc.	414-786-1403
Can	British Columbia, Delta, Microwe Elctrns Corp	604-943-5020
Can	Manitoba, Winnipeg, bbd Electrns, Inc	204-942-2977
Can	Ont. Toronto, Cypress Semiconductor	416-620-7276
Can	Ontario, Mississauga, bbd Electrns, Inc.	416-821-7800
Can	Ontario, Ottawa, bbd Electrns, Inc.	613-564-0014
Can	Quebec, Pointe Claire, bbd Electrns, Inc.	514-697-0801
Intl	Australia, N.S.W. Leichhardt Braemac Pty. Ltd	61-2-564-1211
Intl	Australia, Melbourne, Braemac Pty. Ltd.	61-3-899-1272
Intl	Austria, Wien, Hitronik Vertriebsge GmbH	43-1-877-4199
Intl	Belgium, Wemmel, Linburg, Sonetech	32-2-460-0707
Intl	Belguim, La Hulpe, Cypress Semiconductor	32-2-652-0270
Intl	Denmark, Herlev, Avnet Nortec	45-2-84-20-00
Intl	England, Gants Hill, Pronto Electrn Ltd.	44-81-5546222
Intl	England,Thame,Oxfordshire, Ambar Comps Ltd.	44-8-4426-1144
Intl	France, Blangnac, Arrow Elctrns	33-61-15-75-18
Intl	France, Chantepie, Arrow Elctrns	33-99-41-70-44
Intl	France, Claix, Newtek	33-16-76-98-56-01
Intl	France, Les Ulis Cedex, Cypress Semiconductor	33-1-69-07-55-46
Intl	France, Lyon, Arrow Elctrns	33-78-72-79-42
Intl	France, Rungis Cedex, Arrow Elctrns	33-1-49-78-49-00
Intl	France, Rungis Cedex, Scaib, SA	33-1-46-87-23-13

Intl	France, Rungis Cedex, Newtek S.A.R.L.	33-1-46-87-2200
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Intl	Germany, Dortmund, SASCO GmbH	0231-17-97-91
Intl	Germany, Frankfurn, SASCO GmbH	49-69-61-03-91
Intl	Germany, Hannover, SASCO GmbH	0511-83-90-20
Intl	Germany, Heddesheim, Metronik GmbH	49-6203-4701
Intl	Germany, Henstedt-Ulzburg, Cypress Semiconductor	49-4193-77217
Intl	Germany, Markt Indersdorf, API Electronik GmbH	49-8136 7092
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Intl	Germany, Norderstedt, SASCO GmbH	040-5-23-20-13
Intl	Germany, Nurmberg, SASCO GmbH	0911-42-10-65
Intl	Germany, Numberg, Metronik GmbH	49-911-544966
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Intl	Germany, Stuttgart, Metronik GmbH	49-711-764033
Intl	Germany, Stuttgart, SASCO GmbH	0711-24-45-21
Intl	Germany, Umkirch bei Freiburg, SASCO GmbH	07665-70-18
Intl	Germany, Unterhaching, Metronik GmbH	49-89-611080
Intl	Hong Kong, Kowloon, Tekcomp Electrns, Ltd.	852-3-880-629
Intl	India, Bangalore, Spectra Innovations	80-588-323
Intl	Israel, Tel Aviv, Talviton Electrns	972-3-544-2430
Intl	Italy, Milano, Dott Ing. Guiseppe De Mico s.p.a.	39-29-53-43-600
Intl	Italy, Milano, Silverstar Ltd SPA	39-2-661251
Intl	Italy, Orbassano, Cypress Semiconductor	39-11-397-57-98
Intl	Italy, Rome, Cypress Semiconductor	39-65-920-723
Intl	Japan, Kanagawa, CTC Comps Sys	81-44-852-5121
Intl	Japan, Osaka, Japan Elctrns	81-6-385-6707
Intl	Japan, Tokyo, Cypress Semiconductor	81-423-69-82-11
Intl	Japan, Tokyo, Fuji Electrns Co., Ltd.	81-3-3814-1411
Intl	Japan, Tokyo, N.D.A. Co.,Ltd.	81-3-3264-1321
Intl	Japan, Tokyo, Fujitsu Devices, Inc.	81-3-3490-3321
Intl	Japan, Tokyo, Ryoyo Electro Corp.	81-3-5565-1531
Intl	Japan,Tokyo, Tomen Electrns Corp.	81-3-3506-3673
Intl	Korea, Seoul, Logicom Inc	822-888-2858
Intl	Korea, Seoul, superCHIP Inc	02-576-2111
Intl	Netherlands, Te Nuenen, Sonetech B.V.	31-40-83-70-75
Intl	Norway, Hvalstad, Avnet Nortec Electrns A/S	47-66-84-62-10
Intl	Portugal, Lisboa, ATD Electrna Lda	351-858-0191/2
Intl	Singapore, Electec PTE Ltd	65-294-8389
Intl	Spain, Barcelona, ATD Electrna	93-451-58-93
Intl	Spain, Madrid, ATD Electrna	34-1-66-16-551
Intl	Sweden, Spanga, TH:s Elektronik AB	46-8-362-970
Intl	Sweden, Taby, Cypress Semiconductor	46-8-638-0100
Intl	Switzerland, Zurich, Basix fur Elektronic A.G.	41-1-276-11-11
Intl	Taiwan, Taipei, Prospect Technlg Corp	886-2-820-5353
Intl	U.K. Gatley, Cheshire, Cypress Semiconductor	44-614-28-22-08
Intl	U.K. Hertfordshire, Cypress Semiconductor UK Ltd	44-462-42-05-66
Intl	U.K., Bedford, Arrow Elctrns (UK) Ltd	44-234-270272
Intl	U.K., England, Ambar Comps Ltd	44-844-26-11-44
Intl	U.K., Essex, Pronto Electrn Sys. Ltd	44-81-554-62-22
PR	San Juan, Electrn Tech. Sales	809-798-1300

Distributors

AL	Huntsville, Arrow Electrns	205-837-6955
AL	Huntsville, Marshall Inds	205-881-9235
AZ	Phoenix, Marshall Inds	602-496-0290
AZ	Tempe, Arrow Electrns	602-431-0030
AZ	Tempe, Anthem Electrns, Inc.	602-966-6600
CA	Calabasas, Marshall Inds	818-878-7000
CA	Calabasas, Arrow Electrns	818-880-9686
CA	Chatsworth, Anthem Electrns, Inc.	818-775-1333
CA	E. Irvine, Anthem Electrns, Inc	714-768-4444
CA	El Monte, Marshall Inds	818-307-6000
CA	Irvine, Marshall Inds	714-458-5301
CA	Milpitas, Marshall Inds	408-942-4600
CA	Rancho Cordova, Marshall Inds	916-635-9700
CA	Rocklin, Anthem Electrns, Inc	916-624-9744
CA	San Diego, Arrow Electrns	619-565-4800
CA	San Diego, Marshall Inds	619-627-4140
CA	San Diego, Anthem Electrns, Inc	619-453-9005
CA	San Jose, Arrow Electrns	408-441-9700
CA	San Jose, Anthem Electrns, Inc	408-453-1200
CA	San Jose, Zeus Electrns	408-629-4789
CA	Tustin, Arrow Electrns	714-587-0404
CA	Yorba Linda, Zeus Electrns	714-921-9000
CO	Englewood, Arrow Electrns	303-799-0258
CO	Englewood, Anthem Electrns, Inc	303-790-4500
CO	Thorton, Marshall Inds	303-451-8383
CT	Milford, Falcon Electrns	203-878-5272
CT	Wallingford, Arrow Electrns	203-265-7741
CT	Wallingford, Marshall Inds	203-265-3822
CT	Waterbury, Anthem Electrns, Inc.	203-575-1575
FL	Altamonte Springs, Marshall Inds	407-767-8585
FL	Altamonte Springs, Anthem Electrns Inc	407-831-0007
FL	Deerfield Beach, Arrow Electrns	305-429-8200
FL	Ft. Lauderdale, Marshall Inds	305-977-4880
FL	Lake Mary, Arrow Electrns	407-333-9300
FL	Lake Mary, Zeus Electrns	407-333-3055
FL	St. Petersburg, Marshall Inds	813-573-1399
FL	Winter Park, Falcon Electrns	407-671-3739
GA	Atlanta, Anthem Electrns, Inc.	800-359-3522
GA	Deluth, Arrow Electrns	404-497-1300
GA	Norcross, Marshall Inds	404-923-5750
IL	Itasca, Arrow Electrns	708-250-0500
IL	Schaumburg, Anthem Electrns, Inc.	708-884-0200
IL	Schaumburg, Marshall Inds	708-490-0155
IN	Indianapolis, Arrow Electrns	317-299-2071
IN	Indianapolis, Marshall Inds	317-297-0483
KS	Lenexa, Arrow Electrns	913-541-9542
KS	Lenexa, Marshall Inds	913-492-3121
MD	Columbia, Arrow Electrns	410-596-7800
MD	Columbia, Anthem Electrns Inc	301-995-6640
MD	Gaithersburg, Arrow Electrns	301-596-7800
MD	Silver Springs, Marshall Inds	301-622-1118
MA	Wilmington, Arrow Electrns	617-658-0900
MA	Wilmington, Marshall Inds	617-658-0810
MA	Wilmington, Zeus Electrns	508-658-4776
MA	Wilmington, Anthem Electrns, Inc	508-657-5170
MA	Wilmington, Marshall Inds	508-658-0810
MI	Livonia, Arrow Electrns	313-462-2290
MI	Livonia, Arrow Electrns	313-462-2290
MI	Livonia, Marshall Inds	313-525-5850
MN	Eden Prairie, Arrow Electrns	612-941-5280
MN	Eden Prairie, Anthem Electrns, Inc.	612-944-5454
MN	Plymouth, Marshall Inds	612-559-2211
MO	Bridgeton, Marshall Inds	314-291-4650
MO	St. Louis, Arrow Electrns	314-567-6888
NJ	Fairfield, Marshall Inds	201-882-0320
NJ	Marlton, Arrow Electrns	609-596-8000
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NJ	Pine Brook, Anthem Electrns, Inc.	201-227-7960
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NC	Raleigh, Marshall Inds	919-878-9882
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OH	Dayton, Marshall Inds	513-898-4480
OH	Solon, Arrow Electrns	216-248-3990
OH	Solon, Marshall Inds	216-248-1788
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OR	Beaverton, Marshall Inds	503-644-5050
OR	Beaverton, Anthem Electrns Inc	503-643-1114
PA	Horsham, Anthem Electrns Inc	215-443-5150
PA	Pittsburgh, Arrow Electrns	412-963-6807
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UT	Salt Lake City, Marshall Inds	801-973-2288
WA	Bellevue, Arrow Electrns	206-643-9992
WA	Bothel, Anthem Electrns, Inc.	206-483-1700
WA	Bothel, Anthem Electrns, Inc	206-483-1700
WA	Bothel, Marshall Inds	206-486-5747
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Can	Alberta, Calgary, Semad	403-252-5664
Can	B.C., Columbia, Arrow Electrns	604-421-2333
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Can	Ont., Mississauga, Arrow Electrns	416-670-7769
Can	Ontario, Brampton, Marshall Inds	416-458-8046
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Can	Ontario, Ottawa, Marshall Inds	613-564-0166
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Can	Ontario, Toronto, Semad	416-475-3922
Can	Quebec, Dorval, Arrow Electrns	514-421-7411
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CT	Wallingford, Technology Sls Inc	203-269-8853
FL	Altamonte Springs, Semtronic Assoc., Inc	407-831-8233
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IL	Rolling Meadows, Sumer, Inc	708-991-8500
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CA	Irvine, Milgray Elctrns	714-753-1282
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CA	San Jose, Hall-Mark Elctrns	408-432-4000
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CA	Tustin, Sterling Elctrns	714-259-0900
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Intl	Great Britain, Joseph Elctrns	44-21-643-6999
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Intl	Sweden, Hasselby, Teleinstruments AB	46-8-380370
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CA	La Mirada, Select Electrns	213-921-5159
CA	San Diego, Bestronics of San Diego	619-693-1111
CA	Santa Clara, W.J. Electrns	408-982-9222
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AZ	Tempe, Trembly Assoc.	602-431-9417
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CA	San Diego, KSA Inc	619-453-5720
CA	San Jose, Martek Sales	408-922-3366
CA	Woodland Hills, Technology Solutions, Inc.	818-704-1693
CO	Golden, Trembly Assoc	303-279-3019
FL	Boca Raton, Perrott Assocs	407-362-0191
FL	Casselberry, Perrott Assocs.	407-830-0094
FL	Melbourne, Perrott Assocs.	407-676-0305
FL	Palm Harbor, Perrott Assocs	813-789-9393
FL	Tampa, Perrott Assocs.	813-985-1900
GA	Marietta, Hughes Assocs.	404-578-0064
GA	Norcross, Hughes Assocs. Inc	404-662-1587
IL	Hoffman Estates, Dense-Pac Microsystems	708-882-7572
IL	Inverness, Heartland Tech Mktg	708-358-6622
IN	Indianapolis, Heartland Tech Mktg	317-842-5480
IA	Cedar Rapids, M.I.N.K. Assocs. Inc	319-393-0373
KS	Overland Park, M.I.N.K. Assocs. Inc	913-341-8309
KS	Wichita, M.I.N.K. Assocs. Inc	316-838-0190
MA	Woburn, Compass Technology	617-933-3336
MI	Brighton, Five Star Electrns	313-231-2919
MN	Minneapolis, Tecteam Sales, Inc	612-854-6616
MS	Corinth, Hughes Assocs.	601-287-2915
MO	Bridgeton, M.I.N.K. Assocs. Inc	314-291-5454
NJ	Cherry Hill, Tritek Sales	609-667-0200
NJ	Mahwah, North East Comps	201-825-0233
NM	Albuquerque, Trembly Assoc.	505-266-8616
NC	Charlotte, Quantum Mktg	704-523-8822
NC	Raleigh, Quantum Mktg	919-846-5728
OH	Dayton, Fivestar Electrns	513-299-1718
OH	Solon, Five Star Electrns	216-349-1611
OR	Portland, Quadrep/Crown	503-620-8320
TX	Dallas, Robert R. Thomas Co.	214-732-0045
UT	N. Salt Lake City, Trembly Assoc.	801-295-4703
WA	Bellevue, Quadrep Crown, Inc	206-453-5100
WI	Brookfield, Heartland Tech Mktg	414-789-6860
Can	British Columbia, Burnaby, Vitel Electrns	416-668-0904
Can	Ontario, Kanata, Vitel Electrns	613-592-0090
Can	Ontario, Mississauga, Vitel Electrns	416-564-9720
Can	Quebec, Lachine, Vitel Electrns	514-636-5951

Distributors

Intl	Austrailia, A.J. Distributors Pty. Ltd.	618-269-1244
Intl	England, Dense-Pac Europe	44-91-297-1881
Intl	Finland, Helsinki, Integrated Electrns OY AB	358-351-3133
Intl	France, Rungis Cedex, Newtek SA	33-1-46-872200
Intl	Germany, Martinstried, Atlantik Elektronik GmbH	49-89-8570000
Intl	Hong Kong, Comps Agent Ltd.	852-487-8826
Intl	India, Bangalore, Connekt	91-812-540-620
Intl	Israel, Tirat-Yehuda, El-Gev Electrns	972-3-971-2056
Intl	Italy, Milano, Newtek Italia SPA	39-2-3310-5308
Intl	Italy, Torino, L.E.D. SRL	39-11-2482186
Intl	Japan, Tokyo, Jepico Corp.	81-3-348-0611
Intl	Netherlands, Alcom Electrn BV	31-10-451-9533
Intl	Singapore, Eltee Electroincs	65-285-0633
Intl	South Korea, Seoul, J & Co., Ltd.	82-2-785-3836
Intl	Spain, Madrid, Selco S.A.	34-1-359-4346
Intl	Sweden, Bromma, IE Komponenter AB	46-8-804685
Intl	Switzerland, Zug, Anatec AG	41-42-41-24-41
Intl	Taiwan, Taipei (ROC), Vetron Engnr Enterprise Ltd.	886-2-722-5292
Intl	U.K., Liphook, Hampshire, Silicon Concepts Ltd	44-428-751-617

DIONICS INC., 65 Rushmore Street, Westbury, New York 11590, Tel: 516-997-7474, TWX: 510-222-0974

DSP GROUP, INC., 4050 Moorpark Avenue, San Jose, California 95117, Tel: 408-985-0722, FAX: 408-985-2108

Sales Office & Representatives

Intl	Denmark, Stenlse, Lars Vallentin Elektronik ApS	45-217-2417
Intl	England, Berkshire, MMD, Ltd	44-9734-313232
Intl	France, Le Chesnay, Cedex, A2M	33-1-3954-9113
Intl	Germany, Schenefeld, BEKA Electrn GmbH	49-40-830-0031
Intl	Hong Kong, Kowloon, RTI Inds Co, Ltd	852-795-7421
Intl	Japan, Chiyoda-ku, Tokyo, TOMEN Elctrns Corp	81-3-3506-3473
Intl	Korea, Seoul, Unistandard Corp	82-2-557-5355
Intl	Malaysia, Penang, DCP (M) Sdn Bhd	604-363376
Intl	Singapore, Dynamar Computer Prods Pte., Ltd	65-281-3388
Intl	Taiwan, ROC Taipei, World Peace Indl Co Ltd	886-2-786-5311
Intl	Thailand, Bangkok, Dynamar Computer Prods Co., Ltd	662-278-3690

ECI
SEMICONDUCTOR

FAX: 408-986-9059

ECI SEMICONDUCTOR, 975 Comstock Street, Santa Clara, California 95054, Tel: 408-727-6562, FAX: 408-986-9059

Sales Office & Representatives

CA	Irvine, Premier Tech Sls	707-262-0511
CA	Santa Clara, Premier Tech Sls	408-736-2260
MD	Baltimore, Stemler Assoc	301-944-8262
MA	Chelmsford, Taurus Sls	508-256-2182
MA	Westford, Electrn Microtech Assoc	508-692-0070
MN	Minneapolis, Holmgren Assoc	612-574-9983
NJ	Fairfield, Phase 4	201-575-4343
NY	Great Neck, Phase 4	516-482-1790
OH	Cincinnati, Applied Data Mgmt.	513-579-8108
OH	Willoughby Hills, Applied Data Mgmt.	216-585-2257
TX	Austin, M-Rep	512-250-0828
TX	Dallas, M-Rep	214-484-5711
TX	Palatine, North Central Sls	708-359-5556

EG&G RETICON CORPORATION, 345 Potrero Avenue, Sunnyvale, California 94086-4197, Tel: 408-245-2060, FAX: 408-738-6979

Sales Office & Representatives

CA	El Toro, Southwest Sls Off	714-583-2250
CA	Sunnyvale, Northwest Sls	408-245-2060
GA	Woodstock, South Atlantic Sls Off	404-928-1910
IL	Elk Grove Village, Central Regional Sls	708-640-7785
MA	Salem, Eastern Regional Sls Off	508-745-7400
PA	Montgomeryville, Mid-Atlantic Sls Off	215-368-4003

Intl	England, Berkshire, EG&G Reticon	0734-788666
Intl	Germany, Munich, EG & G Reticon	089-92692-666
Intl	U.K., England, EG&G Reticon	0734-788666

Distributors

Intl	Australia, Victoria, Email Electrns	03-544-8244
Intl	Austria, Wien, Moor Lackner	43-1-61062-100
Intl	Belgium, Bruxelles, Inelco Belgium SA/NV	(02) 216 01 60
Intl	Denmark, Copenhagen, Scansupply A/S	45-1-83-50-90
Intl	Eastern Europe, Taufkirchen, Opteltec, Div. Neumuller GmbH	(089) 6118-0
Intl	Finland, Espoo, Vitikka, Findip Oy	358 0 5281
Intl	France, Sevres Cedex, Tekelec Airtronic	1-45-34-75-35
Intl	France, Verf St.-Denis, Sediame	1-60-63-42-28
Intl	Hong Kong, Wanchai, Schmidt & Co. (HK) Ltd.	5-8330222
Intl	India, Bombay, Zenith Electrns	202 9464
Intl	Israel, Tel Aviv, Telsys Ltd.	494891-5
Intl	Italy, Vicenza, Velco s.r.l.	0-4444/545822
Intl	Japan, Kanagawa-Ken, Neopt	0466-35-0272
Intl	Netherlands, Postbus, Koning En Hartman	015-609906
Intl	New Zealand, Auckland, Professional Electrns Ltd.	463-048
Intl	Norway, Hvalstad, Nordisk Elektronik (Norge) A/S	02-84-62-10
Intl	South Korea, Seoul, J-Tek Corp.	02-557-8039
Intl	Spain, Madrid, Amitron S.A.	91-248-79-59
Intl	Sweden Kista, Nordisk Elektronik AB	46-8/703-46-30
Intl	Taiwan, Taipei, GMP SA	02-501-8231
Intl	West Germany, Munich, EG & G Reticon	089-92692-666

ELANTEC, INC., 1996 Tarob Court, Milpitas, California 95035, Tel: 408-945-1323, outside CA 1-800-333-6314, TWX: 910-997-0649, FAX: 408-945-9305

Sales Office & Representatives

AL	Huntsville, Group 2000 Sales, Inc	205-536-2000
AZ	Phoenix, Reptronix, Ltd.	602-230-2630
CA	Irvine, Harper & Strong	310-424-3030
CA	Mountain View, Brooks Tech. Grp.	415-960-3880
CA	San Diego, Bestronics, Inc.	619-693-1111
CO	Englewood, Thom Luke Sls.	303-649-9717
CT	Wallingford, John E. Boeing	203-265-1318
FL	Melbourne, Photon Sls., Inc.	407-259-8999
GA	Norcross, Group 2000 Sales, Inc	404-729-1889
ID	Boise, First Source	208-378-4680
IL	Hoffman Estates, Minotex, Inc	708-765-3000
IN	Indianapolis, Mohrfield Mktg.	317-546-6969
IN	Leo, Morfield Mktg	219-627-5355
KS	Lenexa, Midtec Assocs.	913-541-0505
KY	Lexington, Morfield Mktg	606-276-0478
MD	Columbia, Third Wave Sol.	401-290-5990
MA	Chelmsford, John E. Boeing	508-256-5800
MI	Brighton, Electrn Sources, Inc.	313-227-3598
MN	Bloomington, High Tech. Sls.	612-844-9933
MO	St. Louis, Midtec Assocs.	314-275-8666
NJ	Marlton, BGR	609-983-1020
NM	Albuquerque, Reptronix, Ltd.	505-292-1718
NY	Babylon, Astrorep, Inc.	516-422-2500
NY	Ithaca, Bob Dean Inc	607-257-1111
NC	Cary, Group 2000 Sales, Inc	919-481-1530
OH	Chagrin Falls, Hester Assocs.	216-338-5103
OR	Portland, Elctrn Solutions	503-292-8204
TX	Austin, OM Assocs.	512-794-9971
TX	Houston, OM Assocs.	713-789-4426
TX	Richardson, OM Assocs.	214-690-6746
UT	Sandy, First Source	801-943-6894
WA	Bellevue, E^2	206-637-0302
WV	Chagrin Falls, Hester Assocs.	216-338-5103
WI	Waukesha, Minotex, Inc	414-542-5352
Can	B.C., Vancouver, Leister Blake Enterprises	604-926-6127
Can	Ont., Concord, Har-Tech Elect.	416-660-3419
Can	Ontario, Nepean, Har-Tech Elect.	613-726-9410
Can	Quebec, Pt. Claire, Har-Tech Elect.	514-694-6110
Intl	Australia, Reptechnic Pty Ltd.	612-953-9844
Intl	China, Borison Tech.	852-311-6361
Intl	Denmark, C-88	45-42-244888
Intl	England, Eltek	44-803-83-4455
Intl	England, Reading, Kudos Thames Ltd	44-734-351010
Intl	Finland, Perel Oy	358-14-434-600
Intl	France, Microel	33-16-9070824
Intl	Hong Kong, Lestina	852-735-1736
Intl	India, IRYS Engnr Services	912-1233-9836
Intl	Israel, Gallium Electrn (1986) Ltd.	972-3540-2242
Intl	Italy, Eurelecttronica	39-2-475841
Intl	Japan, Internix, Inc.	81-3-3369-1105
Intl	Japan, Microtek	81-3-3371-1811
Intl	Korea, Mainsail Mercantile	82-2-745-2761
Intl	New Zealand, Professional Elect. Ltd.	64-9-410-9690
Intl	Singapore, Desner Electrns	65-285-1566
Intl	Spain, ADM Elecronica S.A.	34-1-5304121
Intl	W.Germany, Munich, Scantec GmbH	49-89-859-8021
Intl	W.Germany,Fliedersteig, Scantec, GmbH	49-91-157-7529
Intl	W.Germany,Stuttgart, Scantec GmbH	49-70-215-4027

Distributors

AL	Huntsville, Marshall Inds.	205-881-9235
AL	Huntsville, Nu Horizons	205-722-9330
AZ	Phoenix, Marshall Inds.	602-496-0290
AZ	Tempe, Insight	602-829-1800
CA	Calabasas, Marshall Inds.	818-878-7000
CA	Irvine, Marshall Inds.	714-458-5395
CA	Los Angeles, Insight	818-707-2101
CA	Los Angeles, Zeus Comps	818-889-3838
CA	Milpitas, Marshall Inds.	408-942-4600
CA	Sacramento, Marshall Inds.	916-635-9700
CA	San Diego, Marshall Inds.	619-578-9600
CA	San Diego, Insight	619-587-1100
CA	San Jose, Zeus Comps.	408-629-4789
CA	Yorba Buena, Zeus Comps.	714-921-9000
CO	Thorton, Marshall Inds.	303-451-8383
CT	Wallingford, Marshall Inds.	203-265-3822
FL	Altamonte Springs, Zeus Comps.	407-788-9100
FL	Ft. Lauderdale, Marshall Inds.	305-977-4880
FL	Orlando, Marshall Inds.	407-767-8585
FL	St. Petersburg, Marshall Inds.	813-573-1399
GA	Norcross, Marshall Inds.	404-923-5750
IL	Schaumburg, Marshall Inds.	708-490-0155
IN	Indianapolis, Marshall Inds.	317-297-0483
KS	Lenexa, Marshall Inds.	913-492-3121
MD	Columbia, Zeus Comps.	301-997-1118
MD	Gaithersburg, Marshall Inds.	301-622-1118
MA	Norwood, Gerber Elec.	617-769-6000
MA	Wilmington, Marshall Inds.	508-658-0810
MI	Livonia, Marshall Inds.	313-525-5850
MN	Minneapolis, Marshall Inds.	612-559-2211
MO	Bridgeton, Marshall Inds.	314-291-4650
NJ	Fairfield, Nu Horizons Elect.	201-882-8300
NJ	Fairfield, Marshall Inds.	201-882-0320
NJ	Mt. Laurel, Marshall Inds.	609-234-9100
NM	Albuquerque, Alliance Elct. Inc.	505-292-3360
NY	Endicott, Marshall Inds.	607-796-2345
NY	Hauppauge, Marshall Inds.	516-273-2424
NY	N. Amityville, Nu Horizons Elect.	516-226-6000
NY	Port Chester, Zeus Comps.	914-937-7400
NY	Rochester, Marshall Inds.	716-235-7620
NC	Raleigh, Marshall Inds.	919-878-9882
OH	Dayton, Marshall Inds.	513-898-4480
OH	Dayton, Zeus Comps.	513-293-6162
OH	Solon, Marshall Inds.	216-248-1788
OR	Beaverton, Marshall Inds.	503-644-5050
PA	Pittsburgh, Marshall Inds.	412-788-0441
TX	Austin, Marshall Inds.	512-837-1991
TX	Dallas, Marshall Inds.	214-705-0600
TX	Houston, Marshall Inds.	713-467-1666
TX	Richardson, Insight Elec.	214-783-0800
TX	Richardson, Zeus Comps.	214-783-7010
UT	Salt Lake City, Marshall Inds.	801-973-2288
WA	Bothell, Marshall Inds.	206-486-5747
WI	Waukesha, Marshall Inds.	414-797-8400
Can	Alberta, Calgary, Future Elec.	403-250-5550
Can	Alberta, Edmonton, Future Elec.	403-438-2858
Can	B.C., Vancouver, Future Elec.	604-294-1166
Can	Manitoba, Winnipeg, Future Elec.	204-786-7711
Can	Ontario, Ottowa, Future Elec.	613-820-8313
Can	Ontario, Toronto, Future Elec.	416-612-5200
Can	Quebec, Montreal, Future Elec.	514-694-7710
Intl	Australia, Reptechnic Pty Ltd.	612-953-9844
Intl	Belguim, Microtron N.V.S.A.	32-15-212223
Intl	Denmark, C-88	45-4224-4888
Intl	England, Microelec(METL)	44-84-4278781
Intl	Finland, Perel Oy	358-14-434-600
Intl	Holland, Microtron Holland	31-01620-60308
Intl	Hong Kong, Lestina	852-735-1736
Intl	India, IRYS Engnr Services	912-1233-9836
Intl	Israel, Gallium Electrn (1986) Ltd.	972-3540-2242
Intl	Japan, Internix, Inc.	81-3-3369-1105
Intl	Korea, Mainsail Mercantile	82-2-745-2761
Intl	Norway, NC ScandComp Norway AS	47-22-50-06-50
Intl	Singapore, Desner Electrns	65-285-1566
Intl	Sweden, NC Nordcomp Sweden AS	46-8-7646710
Intl	Switzerland, W.Stolz AG	41-5-684-9000
Intl	Taiwan, Shaw Fuu Entrprs. Co.	886-2-708-5061
Intl	Taiwan, Don Business Corp.	886-2-763-6676
Intl	W.Germany, Topas	49-51-113-1217
Intl	W.Germany, Garching, Alfatron	49-89-4511004
Intl	W.Germany,Fliedersteig, Scantec GmbH	49-91-157-7529
Intl	W.Germany,Munich, Scantec GmbH	49-89-859-8021
Intl	W.Germany,Stuttgart, Scantec GmbH	49-70-215-4027

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NJ (201) 882-8300
MA (617) 246-4442
No.NY (716) 292-0777
MD (410) 995-6330
PA (609) 231-0900
OH (216) 349-2008
FL (305) 735-2555
No.Fl (407) 831-8008
GA (404) 416-8666
AL (205) 722-9330
INT'L (201) 882-4290

EDI
ELECTRONIC DESIGNS INC

ELECTRONIC DESIGNS INC., 42 South Street, Hopkinton, Massachusetts 01748, Tel: 508-435-2341, TELEX: 948004, FAX: 508-435-6302

Sales Office & Representatives

AL	Daphne, Interep Assoc	205-621-1036
AL	Huntsville, Interep Assoc	205-881-1096
AZ	Phoenix, Oasis	602-277-2714
CA	Mt. View, Nexus Sls	415-691-1100
CA	San Diego, Harvey King Inc	619-695-9300
CA	San Jose, EDI West	408-432-7203
CA	Woodland Hills, Varigon	818-594-5080
CT	Hamden, Comp Rep Assocs	203-230-8369
FL	N. Lauderdale, Comp Design Mktg	
FL	Orlando, Comp Design Mktg	407-240-3903
FL	Tampa, Comp Design Mktg	813-886-9721
GA	Norcross, Interep Assoc	404-449-8680
IN	Indianapolis, STB & Assoc Inc.	317-844-9227
IA	Cedar Rapids, Carlson Electrn Sales Assoc.	319-378-1450
KS	Olathe, G.M. Brown & Assoc	913-829-3086
MD	Severna Park, New Era Sales, Inc.	301-544-4100
MA	Westwood, Comp Rep Assoc	617-329-3454
MI	Framington Hills, Action Comps	313-442-9880
MN	St. Paul, K-Rep	612-681-9510
MO	Florissant, G.M. Brown & Assoc.	314-839-3600
NJ	W. Caldwell, Tech Mktg Group	201-226-3300
NY	Binghamton, Gentech	607-648-8833
NY	Fishkill, Tri Tech Elctrns	914-897-5611
NY	Kendall, Gentech	716-659-2470
NY	Liverpool, Gentech	315-451-3480
NY	Melville, Tech Mktg Group	516-351-8833
NY	Penfield, Gentech	713-381-5159
NC	Raleigh, New Era Sls Inc	919-878-0400
OH	Dayton, Midwest Mktg Assoc	513-433-2511
OH	Lyndhurst, Midwest Mktg Assoc	216-381-8575
OR	Beaverton, Electra	503-643-5074
PA	Plymouth Meeting, CMS Sls & Mktg	215-834-6840
TN	Greeneville, Interep Assoc	615-639-3491
TX	Austin, Bravo Sls Inc	512-836-8323
TX	Dallas, Bravo Sls Inc	214-250-2900
TX	Lewisville, EDI Central (Direct Sales Office)	214-219-7288
TX	Tomball, Bravo Sls Inc	713-320-0500
WA	Kirkland, Electra	206-821-7442
Can	Ont, Kanata, Indigo Elctrns Ltd	613-591-1053

Can	Ontario, Mississauga, Indigo Electrns, Ltd.	416-670-0284
Can	Quebec, Dollard des Ormeaux, Indigo Electrns Ltd.	514-696-6104
Intl	Australia, Victoria, KC Electrns Pty. Ltd.	011-613-467-4666
Intl	Belgium, Zaventem, Alcom Electrns BVBA	3-458-30-33
Intl	Denmark, Frederiksberg, T.M. A. Electrns	45-3833-3030
Intl	France, Les Ulis Cedex, Microel	331-69-07-08-24
Intl	Germany, Heidenheim, Inteltek	49-07321-20077
Intl	Hong Kong, Kwai Chung N.T., Dynay Elctrns Ltd	011-852-481-0223
Intl	Ireland, Limerick, Memec Ireland	353-61-330742
Intl	Israel, Tel-Aviv, RDT Electrns Engnr Ltd.	972-3-548-3737
Intl	Italy, Milan, Dimac Elettronica SRL	39-039-491514
Intl	Japan, Tokyo, Internix Inc	011-81-33-369-1101
Intl	Korea, Seoul, Wooyoung Tech Co Ltd	011-822-705-1257-60
Intl	Norway, Oslo, Henaco A/S	47-2-16-21-10
Intl	Singapore, Microtronics Assoc PTE Ltd	011-65-748-1835
Intl	Spain, Barcelona, Monolitica S.A.	34-3-219-40-16
Intl	Sweden, Vallingby, Setron (Sweden) AB	46-8-89-11-25
Intl	Switzerland, Schieren, Dimos AG.	41-1-730-40-88
Intl	Taiwan, Taipei ROC, Master Elctrns Corp	011-886-2-746-0467
Intl	The Netherlands, Alcom Electrns Capelle, B.V.	31-10-4519533
Intl	United Kingdom, Oxon, Micro Call Limited	44-1-0844-261939
Intl	United Kingdom, Surrey, Electrn Designs Europe Ltd.	41-1-0276-723637

Distributors

CA	Agoura Hills, Zeus Comps, Inc.	818-889-3838
CA	Fountain Valley, Bell Microproducts	714-963-0667
CA	San Jose, Zeus Comps, Inc.	408-629-4789
CA	San Jose, Bell Microproducts	408-451-9400
CA	Yorba Linda, Zeus Comps, Inc.	714-921-9000
CT	Danbury, Phase 1 Technology Corp.	203-791-9042
FL	Altamonte Springs, Zeus Comps	407-365-3000
MD	Columbia, Zeus Comps, Inc.	301-997-1118
MA	Hopkinton, Interface	508-435-0100
MA	Shrewsbury, Phase 1 Technlg Corp	508-366-3999
MA	Wakefield, Zeus Comps, Inc.	617-246-8200
MA	Willmington, Bell Microproducts	508-658-0222
NM	Albuquerque, Alliance Electrns	505-292-3360
NY	Deer Park, Phase 1 Technlg Corp	516-254-2600
NY	Port Chester, Zeus Comps, Inc.	914-937-7400
NY	Ronkonkoma, Zeus Comps, Inc.	516-737-4500
OH	Dayton, Zeus Comps, Inc.	513-293-6162
TX	Richardson, Zeus Comps, Inc.	214-783-7010
Can	Ontario, Markham, Semad	416-475-8500

ELECTRONIC SPEECH SYSTEMS, INC, 2493 Industrial Parkway West, Hayward, California 94545, Tel: 510-783-3100, FAX: 510-783-3116

ELETECH ELECTRONICS, 16019 Kaplan Avenue, Industry, CA 91744, Tel: 818-333-6394, FAX: 818-333-6494

Sales Office & Representatives

Intl	Taiwan, Taipei ROC, Eletech Enterprise Co., Ltd.	02-218-0068

ELITE MICROELECTRONICS, INC., 4003 North First Street, San Jose, California 95134-1599, Tel: 408-943-0500, FAX: 408-943-0561

EM MICROELECTRONIC-MARIN SA, Zone industrielle des Sors, Marin, Switzerland CH-2074, Tel: 41-38/35-51-11, TELEX: 952 790 eem ch; Cable: eem, FAX: 41-38/35-54-03

Distributors

TX	Richardson, EM Microelectronic	214-238-8184
Intl	Australia, Victoria, Dice Solutions	61-3-761-1031
Intl	Austria, Wien, Moor Elektornik Ges.m.b.H	43-1-610-62-0
Intl	Brazil, Sao Paulo, Quickchip Ltda	55-11-814-3601
Intl	Denmark, Holeby, Henckel Gruppen A/S	45-53-90-63-33
Intl	Finland, Espoo, NC Nordcomp Oy	358-0-859-3699
Intl	France, Levallois-Perret Cedex, Axco E.u.r.l.	33-147-58-12-20
Intl	Germany, Munchen, AVNET E2000	49-89-451-10-01
Intl	Israel, Savion, Trust Electrns Ltd	972-3-345-026
Intl	Italy, Milano, Skylab S.r.l.	39-2-667-10-822
Intl	Japan, Tokyo, Nippon Precision Device Corp	81-3-3260-1411
Intl	Korea, Seoul, Shinhwa Corp	02-554-6431-5
Intl	Netherlands, Amsterdam, Nijkerk Elektronika B.V.	31-20-54-95-969
Intl	Norway, Fjellhamar, Heko-Elektronikk & Data A/S	47-6-790-5244
Intl	Portugal, Lisboa, Amitron Arrow Electrna Lda	351-1-3621-283/4
Intl	Spain, Madrid, Amitron Arrow S.A.	34-1-541-54-02, 34-1-542-09-06
Intl	Sweden, Solna, NC Nordcomp Sweden AB	46-8-764-6710
Intl	Switzerland, Regensdorf, Eurodis Electrn AG	41-1-843-31-11
Intl	Switzerland, Zurich, Futurel	41-1-632-57-31
Intl	Taiwan, Taipei ROC, Solomon Technlg Corp	886-2-760-58-58
Intl	Turkey, Geneve, Fudem Trading SA	022-311-98-22
Intl	U.K., Essex, Pronto Elctrn Sys Ltd	44-81-554-5700

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Sales Office & Representatives

AL	Madison, Concord Comp	205-772-8883
AZ	Scottsdale, Fred Board Assocs	602-994-9388
AZ	Tucson, Fred Board Assocs	602-299-1508
CA	Cupertino, Costar, Inc	408-446-9339
CA	Encinitas, Bager Elctrns	619-632-8816
CA	Fountain Valley, Bager Elctrns	714-957-3367
CA	Woodland Hills, Bager Elctrns	818-712-0011
CO	Colorado Springs, Western Region Mktg	719-548-8282
CO	Westminster, Western Region Mktg	303-428-8088
FL	Casselberry, Dyne-A-Mark	407-831-2822
GA	Norcross, Concord Comp	404-416-9597
IL	Itasca, LTD Technologies	708-773-2900
IN	Indianapolis, C.C. Electro Sales, Inc	317-921-5000
KS	Shawnee Mission, Microtronics	913-262-1444
MD	Ellicott City, Technology Sales, Inc	410-461-7802
MA	Needham Heights, Rosen Assocs., Inc	617-449-4700
MN	Eden Prairie, Electromark	612-944-5850
NJ	Parlin, JMR Sales, Inc	908-525-8000
NY	Pittsford, Elcom Sales, Inc	716-385-1400
NY	Skaneateles, Elcom Sales, Inc	315-685-8967
NY	Wading River, Niktronics	516-929-4671
NC	Raleigh, WLA & Assocs	919-231-9939
OH	Sheffield, J.D. Babb	216-934-4454
OR	Portland, Matrex Sales	503-245-8080
PA	Trevose, Omega Electrn Sales	215-244-4000
SC	Columbia, WLA & Assocs	803-699-3360
TX	Austin, Comp Tech Sales	512-288-7328
TX	Dallas, Comp Tech Sales	214-783-8831
TX	Houston, Comp Tech Sales	713-690-3011
UT	Salt Lake City, Western Region Mktg	801-268-9768
WA	Bellevue, Matrex Sales	206-643-0363
WI	Milwaukee, LTD Technologies	414-774-1000
Can	Ont., Markham, Epson Mfg	416-479-8866

Distributors

AL	Bell Inds., Inc	205-837-1074
AL	Huntsville, Bell Inds., Inc	205-722-9330
AZ	Scottsdale, Electrn Supply	800-622-3726
AZ	Tempe, Bell Inds., Inc	602-966-7800
CA	Agoura Hills, Bell Inds., Inc.	818-879-9494
CA	Cypress, Bell Inds., Inc.	714-895-7801
CA	Irvine, Integrated Electrns	714-837-9960
CA	Los Angeles, Bell Inds., Inc.	310-826-2355
CA	Riverside, Electrn Supply	714-683-7300
CA	Rocklin, Bell Inds., Inc.	916-652-0414
CA	Sacramento, Integrated Electrns	916-363-6030
CA	San Diego, Bell Inds., Inc.	619-268-1277
CA	San Diego, Electrn Supply	619-693-8222
CA	San Jose, Electrn Supply	408-453-3770
CA	San Jose, Merit Electrns, Inc.	408-434-0800
CA	Sunnyvale, Bell Inds., Inc.	408-734-8570
CA	Sunnyvale, Integrated Electrns	408-734-8500
CO	Denver, Bell Inds., Inc.	303-691-9010
CO	Denver, Integrated Electrns	303-292-5537
CT	Nu Horizons Elctrns Corp	203-265-0162
CT	Wallingford, Cronin Elctrns, Inc.	203-265-3134
CT	Wallingford, Bell Inds., Inc	203-269-6801
FL	Altamonte Springs, Bell Inds., Inc	407-339-0078
FL	Ft. Lauderdale, Bell Inds., Inc	305-421-1997
FL	Ft. Lauderdale, Bell Inds., Inc	305-735-2555
FL	Melbourne, Pro-Formance Elctrns	407-768-2866
FL	Tampa, Bell Inds., Inc	813-541-4434
GA	Norcross, Bell Inds., Inc	404-446-7167
GA	Norcross, Bell Inds., Inc	404-416-8666
IL	Bensenville, Voyager Elctrns	708-860-1300
IL	Elk Grove Village, Bell Inds., Inc.	708-640-1910
IL	Hoffman Estates, Integrated Electrns	708-843-2040
IL	Urbana, Bell Inds., Inc.	217-328-1077
IN	Ft. Wayne, Bell Inds., Inc.	219-423-3422
IN	Indianapolis, Bell Inds., Inc.	317-875-8200
IN	Indianapolis, Custom Service Elctrns	317-879-9119
IA	Bell Inds., Inc.	319-395-0730
KS	Olathe, ECS, Inc	913-782-7787
KY	Bell Inds., Inc.	800-582-7492
KY	Bell Inds., Inc.	800-445-8795
MD	Columbia, Bell Inds., Inc	410-995-6330
MD	Jessup, Bell Inds., Inc	301-290-5100
MA	Andover, Bell Inds., Inc	508-474-8880
MA	Needham, Cronin Elctrns, Inc	617-449-5000
MA	Wakefield, Nu Horizons Elctrns Corp	617-246-4442
MI	Bell Inds., Inc.	800-937-2355
MN	Bell Inds., Inc.	612-941-1493
MN	Fridley, Voyager Elctrns	612-571-7766
MN	Thief River Falls, Digi-Key Corp	612-944-5855
MO	Bell Inds., Inc.	314-647-2355
NJ	Edison, Dove Elctrns	908-738-0321
NJ	Fairfield, Bell Inds., Inc	201-227-6060
NJ	Flanders, Dove Elctrns	201-927-6339
NJ	Mt. Laurel, Bell Inds., Inc	609-231-0900
NJ	Pine Brook, Nu Horizons Elctrns Corp	201-882-8300
NJ	W. Berlin, G.C.I. Corp	609-768-6767
NM	Albuquerque, Bell Inds., Inc.	505-292-2700
NY	Amityville, Nu Horizons Elctrns Corp	516-226-6000
NY	E. Setauket, Dove Elctrns	516-689-7733
NY	Rochester, Nu Horizons Elctrns Corp.	716-292-0777
NC	Bell Inds., Inc	919-821-4041
OH	Dayton, Bell Inds., Inc.	513-435-8660
OH	Dayton, Bell Inds., Inc.	513-434-8231
OR	Beaverton, Integrated Electrns	503-641-1690
OR	Lake Oswego, Bell Inds., Inc.	503-635-6500
PA	Pittsburgh, Bell Inds., Inc	412-787-3883
PA	Trevose, Bell Inds., Inc	215-953-2800
SC	Bell Inds., Inc	800-322-7908
TN	Bell Inds., Inc.	615-367-4400
TX	Austin, Norvell Elctrns., Inc	512-343-2900
TX	Austin, Omni-Pro Elctrns	512-794-9200
TX	Carollton, Omni-Pro Elctrns	214-713-9000
TX	Dallas, Norvell Electrns, Inc	214-233-0020
TX	Houston, Norvell Elctrns., Inc	713-462-1666
TX	Houston, Omni-Pro Elctrns	713-270-1700
TX	Richardson, Bell Inds., Inc.	214-690-0466
UT	Midvale, Bell Inds., Inc.	801-255-9611
UT	West Valley City, Integrated Electrns.	801-977-9750
VA	Vienna, Dove Elctrns	703-893-1821
WA	Bell Inds., Inc.	206-867-5410
WA	Bellevue, Integrated Electrns	206-455-2727
WI	Waukesha, Bell Inds., Inc.	414-547-8879

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FAX: 214-680-1059

ERICSSON COMPONENTS, 403 International Parkway, Richardson, Texas 75081, Tel: 214-907-7911

Sales Office & Representatives

AL	Huntsville, Electrn Mktg. Assoc.	205-880-8050
AZ	Phoenix, Suntech Sls	602-860-8262
CA	Cupertino, PEI Assocs.	408-253-1960
CA	Garden Grove, Elsco Elec.	714-891-4621

CA	San Diego, Elsco Elec.	619-292-1771
CT	Bloomfield, SIR Assocs.	203-243-9343
FL	Orlando, Richmar Assocs.	407-352-3755
GA	Atlanta, Electrn Mktg. Assocs.	404-448-1215
IL	Downers Grove, Richmar Elec.	312-968-0118
IN	Indianapolis, Richmar Elec.	317-577-9950
IA	Iowa City, Richmar Elec.	319-354-8894
MA	Westford, SIR Assocs.	508-692-2500
MA	Whitinsville, Power Factor & Assocs	508-234-6415
NJ	Parlin State, JMR Sls.	201-525-8000
NY	Wading River, Niktronics	516-929-5756
NC	Raleigh, Electrn Mktg. Assocs.	919-847-8800
SC	Greenville, Elec. Mktg. Assoc.	803-233-4637
WA	Redmond, EMG Elec.	206-882-0962
WA	Vancouver, EMG Elec.	206-944-0761
WI	Butler, Richmar Elec.	414-781-1730

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Sales Office & Representatives

AL	Daphne, Interep Assocs	205-621-1036
AL	Huntsville, Interep Assocs	205-881-1096
AZ	Mesa, Sys Sls of Ariz.	602-464-9989
CA	Cerritos, Exar Corp (Southern)	231-860-1919
CA	Costa Mesa, Competitive Technlg	714-540-5501
CA	Escondido, Eagle Tech Sls	619-743-6550
CA	San Jose, Exar Corp (Northern)	408-434-6400
CA	San Jose, Tri Par	408-262-3190
CO	Boulder, Front Range Mktg	303-443-4780
FL	Altamonte Springs, Semtronic Assocs	407-831-8233
FL	Clearwater, Semtronic Assocs	813-461-4675
FL	Ft. Lauderdale, Semtronic Assocs	305-731-2484
GA	Norcross, Interep Assocs	404-449-8680
IL	Mt. Prospect, Exar Corp (Central)	708-670-7082
IL	Northbrook, Dolin Sls Co Inc	708-498-6770
IN	Kokomo, Schillinger Assocs Inc	317-457-7241
IA	Cedar Rapids, C.H. Horn & Assoc	319-393-8703
KS	Wichita, DLE Elctrns	316-683-6400
MD	Columbia, Cheasapeake Technlg Inc	410-740-2993
MA	Burlington, Exar Corp (Eastern)	617-273-3927
MA	Tewksbury, A/D Sls	508-851-5400
MI	Ann Arbor, Exar Corp (Central)	313-994-1423
MI	Farmington Hills, Action Comps Sls	313-442-9880
MO	St. Louis, The John G. Macke Co	314-432-2830
NJ	Haddonfield, Sunday-O'Brien	609-429-4013
NM	Albuquerque, System Sls of Ariz.	505-889-2901
NY	Buffalo, Quality Comps	716-837-5430
NY	Central Islip, Exar Corp (Eastern)	516-582-4420
NY	Manlius, Quality Comps	315-682-8885
NC	Raleigh, Zucker Assocs	919-782-8433
TN	Greenville, Interep Inc	615-639-3491, 615-639-3492
TX	Austin, Bravo Sls Inc	512-836-8323
TX	Dallas, Bravo Sls Inc	214-250-2900
TX	Lewisville, Exar Corp (Central)	214-315-2182
TX	Tomball, Bravo Sls Inc	713-320-0500
UT	Murray, Front Range Mktg	801-566-2500
WI	Glendale, Dolin Sls Co Inc	414-482-1111
Can	Ont., Brampton, Clark Hurman Assoc	416-840-6066
Can	Ont., Nepean, Clark Hurman Assoc	613-727-5626
Can	Que., Pointe Claire, Clark Hurman Assoc	514-426-0453
Intl	Australia, Moorabbin, Victoria, Tronic Bits Ltd	61-3-555-6777
Intl	Austria, Vienna, Transohm Vertriebs GmbH	43-222-610660
Intl	Austria, Vienna, Codico GmbH & Co. KG	43-222-862428
Intl	Brazil, Sao Paulo, Rohm Elctrns Ltd	5511-240-9211
Intl	Denmark, Horesholm, Mer-el A/S	45-42-571000
Intl	England, Milton Keynes, Rohm Elctrns (UK) Ltd	44-908-271311
Intl	Finland, Espoo, Yleiselektroniikka/Oy	358-0-452-1255
Intl	Finland, Kemi, Spelicon Oy	358-698-21517
Intl	France, Sevres Cede, Tekelec Airtronic	33-1-4623-2229
Intl	Germany, Korschenbroich, Rohm Elctrns GmbH	49-2161-610135
Intl	Holland, Amsterdam, Nijkerk Elektronika	31-20-549-5969
Intl	Hong Kong, Kowloon, Rohm Elctrns Ltd	011-852-375-6262
Intl	India, Bangalore, Testech Elctrns	91-81-2611201
Intl	Israel, Herzlia, Vectronics Ltd	972-052-556070
Intl	Italy, Milano, Moxel S.R.L.	39-2-33-404205
Intl	Japan, Kawasaki-Shi, CTC Comps Sys Co Ltd	044-852-5121
Intl	Japan, Kyoto, Exar Japan Corp	075-322-8440
Intl	Japan, Minatoku, Exar Tokyo Off	03-3280-1755
Intl	Japan, Tokyo, Tokyo Electron Ltd	03-3340-8257
Intl	Korea, Seoul, HB Corp	011-82-2-579-3495
Intl	Mexico, Electrna Comp	525-575-8465
Intl	Norway, Skedsmokorset, Hefro Electronikka	47-687-0250
Intl	Portugal, Lisboa, Niposom J. Nabais Lda	351-1-896610
Intl	Singapore, Exar Technlgs Pte Ltd	011-65-741-4655
Intl	So Africa (Mt. View, CA), Intectra	415-967-8818
Intl	So. Africa, Randburg, Fairmont	27-11-886-2920
Intl	Spain, Madrid, Unitronics, S A	34-1-542-5204
Intl	Sweden, Nacka, Memec Scandinavia A.B.	46-8-6434190
Intl	Switzerland, Baden-Dattwill, Ascom-Primotec AG	41-56-840171
Intl	Tawian, Taipei, Marrow Elctrns Corp	011-886-2-768-2505
Intl	Turkey, Istanbul, Inter A.S.	90-1-360-4374
PR	Hato Rey, Semtronic Assoc	809-766-0701

Distributors

AL	Bell Inds	205-837-1074
AL	Huntsville, Marshall Elctrns	205-881-9235
AL	Huntsville, Reptron	205-722-9500
AL	Huntsville, Future Elctrns	205-830-2322
AL	Huntsville, Nu-Horizons	205-722-9330
AZ	Phoenix, Sterling Elctrns	602-437-5565
AZ	Phoenix, Marshall Elctrns	602-496-0290
AZ	Phoenix, Future Elctrns	602-968-7140
AZ	Scottsdale, A.V.E.D.	602-951-9788
AZ	Tempe, Bell Inds	602-966-7800
CA	Agoura Hills, Bell Inds	818-879-9494
CA	Calabasas, Marshall Elctrns	818-878-7000
CA	Chatsworth, Future Elctrns	818-772-6240
CA	Cypress, Bell Inds	714-895-7801
CA	El Monte, Marshall Elctrns	818-307-6000
CA	Irvine, Marshall Elctrns	714-458-5360
CA	Irvine, Future Elctrns	714-250-4141
CA	Los Angeles, Bell Inds	213-826-6778
CA	Los Angeles, Bell Inds	213-826-6778
CA	Milpitas, Marshall Elctrns	408-942-4600
CA	Rancho Cardova, Marshall Elctrns	916-635-9700
CA	Rocklin, Bell Inds	916-652-0414
CA	San Diego, Bell Inds	619-268-1277
CA	San Diego, Marshall Elctrns	619-578-9600
CA	San Diego, Future Elctrns	619-625-2800
CA	San Diego, A.V.E.D.	619-558-8890
CA	San Jose, Future Elctrns	408-434-1122
CA	San Jose, Jaco	408-432-9290
CA	Sunnyvale, Bell Inds	408-734-8570
CA	Tustin, A.V.E.D.	714-259-8258
CA	Tustin, Jaco	714-258-9003
CA	Visalia, A.V.E.D.	209-734-8661
CA	Westlake Village, Jaco	805-495-9998
CO	Broomfield, Future Elctrns	303-421-0123
CO	Denver, Bell Inds	303-691-9010
CO	Englewood, Sterling Elctrns	303-792-3939
CO	Thornton, Marshall Elctrns	303-451-8444
CO	Wheatridge, A.V.E.D.	303-422-1701
CT	Nu Horizons	203-265-0162
CT	Bethel, Future Elctrns	203-743-9594
CT	Wallingford, Marshall Elctrns	203-265-3822
CT	Wallingford, Bell Inds	203-269-6801
FL	Altamonte Springs, Marshall Elctrns	305-767-8585
FL	Altamonte Springs, Future Elctrns	407-767-8414
FL	Altamonte Springs, Bell Inds	407-339-0078
FL	Boca Raton, Jaco	407-241-7943
FL	Ft. Lauderdale, Marshall Elctrns	305-977-4880
FL	Ft. Lauderdale, Reptron Elctrns	305-735-1112
FL	Ft. Lauderdale, Nu Horizons	305-735-2555
FL	Largo, Future Elctrns	813-530-1222
FL	St. Petersburg, Marshall Elctrns	813-573-1399
FL	Tampa, Reptron Elctrns	813-855-4656
GA	Norcross, Reptron Elctrns	404-446-1300
GA	Norcross, Future Elctrns	404-441-7676
GA	Norcross, Marshall Elctrns	404-923-5750
GA	Norcross, Nu-Horizons	404-416-8666
IL	Elk Grove Village, Bell Inds	708-640-1910
IL	Hoffman Estates, Future Elctrns	708-882-1255
IL	Schaumburg, Marshall Elctrns	708-490-0155
IL	Schaumburg, Reptron Elctrns	708-882-1700
IN	Ft. Wayne, Bell Inds	219-423-3422
IN	Indianapolis, Marshall Elctrns	317-297-0483
IN	Indianapolis, Bell Inds	317-634-8200
KS	Lenexa, Marshall Elctrns	913-492-3121
MD	Columbia, Vantage	301-720-5100
MD	Columbia, Future Elctrns	301-290-0600
MD	Columbia, Nu Horizons	410-995-6330
MD	Columbia, Jaco	301-995-6620
MD	Jessup, Bell Inds	301-953-2566
MD	Silver Springs, Marshall Elctrns	301-622-1118
MA	Andover, Bell Inds	508-474-8880
MA	Boston, Future Elctrns	508-779-3000
MA	Tewksbury, Jaco	508-640-0010
MA	Wakefield, Nu Horizons	617-246-4442
MA	Wilmington, Marshall Elctrns	508-658-0810
MI	Ann Arbor, Bell Inds	313-971-9093
MI	Livonia, Reptron Elctrns	313-525-2700
MI	Livonia, Marshall Elctrns	313-261-6270
MI	Livonia, Future Elctrns	313-261-6270
MN	Eden Prairie, Future Elctrns	612-944-2200
MN	Minnetonka, Reptron Elctrns	612-938-0000
MN	Plymouth, Marshall Elctrns	612-559-2211
MO	Bridgeton, Marshall Elctrns	314-291-4650
MO	St. Louis, Future Elctrns	414-786-1884
NJ	Fairfield, Marshall Elctrns	201-882-0320
NJ	Fairfield, Bell Inds	201-227-6060
NJ	Mt. Laurel, Marshall Elctrns	609-234-9100
NJ	Parsippany, Future Elctrns	201-299-0400
NJ	Pine Brook, Nu Horizons	201-882-8300
NJ	West Berlin, GCI	609-768-6767
NM	Albuquerque, Bell Inds	505-292-2700
NY	Hauppauge, Marshall Elctrns	516-273-2424
NY	Hauppauge, Jaco	516-273-5500
NY	Hauppauge, Future Elctrns	516-234-4000
NY	Johnson City, Marshall Elctrns	607-798-1611
NY	Liverpool, Future Elctrns	315-451-2371
NY	N. Amityville, Nu Horizons	516-226-6000
NY	Rochester, Marshall Elctrns	716-235-7620
NY	Rochester, Future Elctrns	716-272-1120
NY	Rochester, Nu Horizons	716-292-0777
NC	Concord, Future Elctrns	704-455-9030
NC	Raleigh, Marshall Elctrns	919-878-9882
NC	Raleigh, Reptron Elctrns	919-832-3117
NC	Raleigh, Future Elctrns	919-790-7111
NC	Raleigh, Jaco	919-876-7767
OH	Dayton, Marshall Elctrns	513-898-4480
OH	Dayton, Bell Inds	513-434-8231
OH	Dayton, Bell Inds	513-435-8660
OH	Mayfield Heights, Future Elctrns	216-449-6996
OH	Solon, Marshall Elctrns	216-248-1788
OH	Solon, Reptron Elctrns	216-349-1415
OR	Beaverton, Future Elctrns	503-645-9454
OR	Beaverton, Marshall Elctrns	503-644-5050
OR	Beaverton, Bell Inds	503-644-1500
PA	McKean, Advacom	814-476-7774
PA	Pittsburgh, Marshall Inds	412-788-0441
PA	Trevose, Bell Inds	215-953-2800
TN	Nashville, Bell Inds	615-367-4400
TX	Addison, Jaco	214-733-4300
TX	Austin, Jaco	512-835-0220
TX	Austin, Marshall Elctrns	512-837-1991
TX	Brownsville, Marshall Elctrns	512-542-4589
TX	Carrollton, Marshall Elctrns	214-895-9200
TX	Carrollton, Reptron Elctrns	214-702-9373
TX	El Paso, Marshall Elctrns	915-593-0706
TX	Houston, Marshall Elctrns	713-467-1666
TX	Richardson, Future Elctrns	214-437-2437
TX	Richardson, Bell Inds	214-690-0466
TX	Stafford, Jaco	713-240-2255
UT	Midvale, Bell Inds	801-561-9691
UT	Salt Lake City, Marshall Elctrns	801-973-2288
UT	Salt Lake City, Future Elctrns	801-972-8489
UT	Westvalley, A.V.E.D.	801-975-9500
WA	Bothell, Marshall Elctrns	206-486-5747
WA	Redmond, Future Elctrns	206-881-8199
WI	Waukesha, Marshall Elctrns	414-797-8400
WI	Waukesha, Bell Inds	414-547-8879
WI	Waukesha, Future Elctrns	414-786-1884
Can	Alb., Calgary, ITT Multicomponents	403-273-2780
Can	Alb., Calgary, Future Elctrns	403-250-5550

Can	Alb., Edmonton, Future Elctrns	403-438-2858
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Can	B.C., Burnaby, ITT Multicomponents	604-291-8866
Can	B.C., Vancouver, Future Elctrns	604-294-1166
Can	Manitoba, Winnipeg, ITT Multicomponents	204-697-2300
Can	Manitoba, Winnipeg, Future Elctrns	204-786-7711
Can	Ont., Brampton, Marshall Elctrns	416-458-8046
Can	Ont., Concord, ITT Multicomponents	416-736-1144
Can	Ont., Mississauga, Future Elctrns	416-612-9200
Can	Ont., Nepean, ITT Multicomponents	613-596-6980
Can	Ont., Ottawa, Future Elctrns	613-820-8313
Can	Que., Montreal, Future Elctrns	514-694-7710
Can	Que., Ville St. Laurent, ITT Multicomponents	604-291-8866
Can	Quebec, Future Elctrns	418-877-6666
Can	Quebec, Marshall Elctrns	514-694-8142
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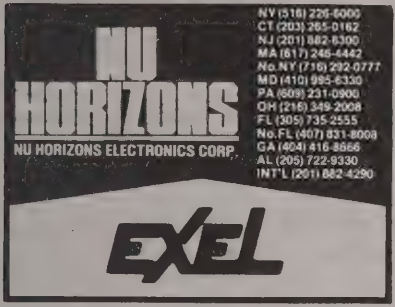

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95161, Tel: 408-432-0500, FAX: 408-432-8710

Sales Office & Representatives

AL	Huntsville, Strategic Mktg	205-464-0490
AZ	Mesa, System Sales	602-464-9989
CA	Dana Point, Eltec Enterprises	714-493-7003
CA	Diamond Bar, Eltec Enterprises	714-861-4779
CA	San Diego, C K Assoc	619-279-0420
CA	San Jose, Pro Assocs Inc	408-248-5300
CA	San Jose, Exel Microelec	408-432-0500
CA	Thousand Oaks, Eltec Enterprises	805-492-3017
CO	Colorado Springs, Alliance Electrns	719-282-0111
CO	Denver, Alliance Electrns	303-433-1648
CO	Parker, Alliance Electrns	303-841-4664
FL	Altamonte Springs, Semtronic Assoc.	407-831-8233
FL	Clearwater, Semtronic Assoc.	813-461-4675
FL	Ft. Lauderdale, Semtronic Assoc.	305-731-2484
GA	Duluth, Strategic Mktg	404-381-7430
IL	Northbrook, Dolin Sales Co.	708-498-6770
IN	Kokomo, Schillinger Assoc.	317-455-2708
MD	Towson, Advanced Technology Sales	301-296-9360
MA	Harvard, Cycle Sales Inc.	508-456-6868
MI	Grasse Point Park, Greiner Assoc, Inc.	313-499-0188
MN	Minneapolis, Comps Group	612-374-1250
MO	St. Louis, John Macke	314-432-2830
NJ	E. Hanover, Emtec Sls	201-428-0600
NM	Albuquerque, System Sales of Arizona	505-889-2901
NY	Buffalo, Quality Comps	716-837-5430
NY	Manlius, Quality Comps	315-682-8885
OR	Portland, ES/Chase Co., Inc.	503-292-8840
TN	Jonesboro, Strategic Mktg	615-753-5518
TN	Nashville, Strategic Mktg	615-883-7882
TX	Austin, Sage Mktg	512-335-0300
TX	Bedford, Sage Mktg	817-267-7781
UT	Salt Lake City, R2 Mktg	801-595-0631
WA	Kirkland, ES/Chase Co., Inc.	206-823-9535
Can	Ont., Islingotnga, Pipe-Thompson Ltd	416-236-2355
Can	Ont., Kanata, Pipe Thompson Ltd	613-591-1821
Intl	Australia, Victoria, Tronic Bits	011-613-555-6777
Intl	France, Rungis Cedex, Rohm Electrns GmbH	011-33-1-46-759051
Intl	Hong Kong, Kowloon, RTI Inds Co.Ltd.	011-852-795-7421
Intl	Hong Kong, Kowloon, Rohm Electrns Co. Ltd.	011-852-739y791-8
Intl	India, Bombay, Integrated Circuits Pvt. Ltd.	011-91-22-411-45-85
Intl	Japan, Tokyo, KH Electrns Corp.	011-81-3-587-1041
Intl	Japan, Tokyo, Sys Mktg	011-81-3-254-2751
Intl	Korea, Seoul, Hanaro Corp.	011-82·2-558-1144
Intl	Malaysia, Penang, Microtronics Assoc Pte. Ltd.	04-214518
Intl	Mexico, Electrna Comp Modulos	011-52-604-95-19
Intl	New Zealand, Auckland, Professional Elctrns. Ltd.	64-9-463-048
Intl	Singapore, Industrial Park, Microtronics Assoc. PTD, Ltd.	011-65-748-1835
Intl	So. Africa, Randburg, Fairmont Electrns	011-2711-886-2920
Intl	Taiwan, Taipei, Sea Union Eng. Ltd.	011-886-2-7516856
Intl	Tawian, Taipei, Jeritron Ltd.	011-886-2-882-0710
Intl	Thailand, Bangkok, Microtronics Thai Ltd.	662-254-8676
Intl	United Kingdom, Milton Keynes, Rohm Electrns, U.K.	011-44-908-271311
Intl	West Germany, Korschenbroich, Rohm Electrns GmbH	011-49-2161-6101
PR	Hado Rey, Semtronic Assoc	809-766-0701

Distributors

AL	Huntsville, Nu Horizons	205-772-9330
AL	Huntsville, Reptron	205-722-9500
AL	Huntsville, Marshall Inds	205-881-9235
AZ	Phoenix, Marshall Inds	602-496-0290
AZ	Scottsdale, Added Value Electrn	602-951-9788
AZ	Tempe, Bell Inds	602-966-7800
CA	Agoura Hills, Bell Inds	818-706-2608
CA	Calabasas, Marshall Inc.	818-878-7000
CA	Cypress, Bell Inds	714-895-7801
CA	El Monte, Marshall Ind. (Corp. Office)	818-307-6097
CA	Irvine, Marshall Ind.	714-458-5360
CA	Los Angeles, Bell Inds (Corporate)	213-826-6778
CA	Milpitas, Marshall Ind.	408-942-4600
CA	Rancho Cordova, Marshall Ind.	916-635-9700
CA	Rocklin, Bell Inds	916-652-0414
CA	San Diego, Added Value Elctrns	619-558-8890
CA	San Diego, Bell Inds	619-268-1277
CA	San Diego, Marshall Ind.	619-578-9600
CA	Sunnyvale, Bell Inds	408-734-8570
CA	Tustin, Added Value Elctrns	714-259-8258
CO	Thornton, Marshall Ind.	303-451-8383
CO	Wheatridge, Added Value Elctrns	303-422-1701
CO	Wheatridge, Bell Inds	303-424-1985
CT	Wallingford, Marshall Ind.	203-265-3822
CT	Wallingford, Beli Inds	203-269-6801
FL	Altamonte Springs, Bell Inds	407-339-0078
FL	Altamonte Springs, Marshall Ind.	407-767-8585
FL	Altamonte Springs, Vantage Comps Inc.	407-682-1199
FL	Fort Lauderdale, Reptron	305-735-1112
FL	Ft. Lauderdale, Nu Horizons	305-735-2555
FL	Ft. Lauderdale, Marshall Ind.	305-977-4880
FL	St. Petersburg, Marshall Ind.	813-576-1399
FL	Tampa, Reptron	813-855-4656
FL	Tampa, Reptron (Corporate)	813-854-2351
GA	Norcross, Nu Horizons	404-416-8666
GA	Norcross, Bell Electrns	404-662-0923
GA	Norcross, Reptron	404-446-1300
GA	Norcross, Marshall Ind.	404-923-5750
IL	Elk Grove Village, Bell Inds	708-640-1910
IL	Schaumburg, Marshall Ind.	708-490-0755
IL	Schaumburg, Reptron	708-882-1700
IN	Ft. Wayne, Bell Electrns	219-423-3422
IN	Indianapolis, Bell Electrns	317-875-8200
IN	Indianapolis, Marshall Ind.	317-297-0483
KS	Lenexa, Marshall Ind.	913-492-5121
MD	Columbia, Vantage (Corporate)	301-720-5100
MD	Columbia, Nu Horizons	301-995-6330
MD	Jessup, Bell Inds	301-953-2566
MD	Silver Springs, Marshall Ind.	301-622-1118
MA	Andover, Bell Inds	508-474-8880
MA	Andover, Vantage Comps Inc	508-588-3900
MA	Wakefield, Nu Horizons	617-246-4442
MA	Wilmington, Marshall Ind.	508-658-0810
MI	Livonia, Reptron Elctrns.	313-525-2700
MI	Livonia, Marshall Ind.	313-525-5850
MN	Fridley, Voyager Electrns	612-571-7766
MN	Minnetonka, Reptron	612-938-0000
MN	Plymouth, Marshall Ind.	612-559-2211
MO	Bridgeton, Marshall Ind.	314-291-4650
NJ	Clifton, Vantage Comps	201-777-4100
NJ	East Brunswick, Bell Inds	201-613-0200
NJ	Fairfield, Marshall Ind.	201-882-0320
NJ	Mt. Laurel, Nu Horizons	609-231-0900
NJ	Mt. Laurel, Marshall Ind.	609-234-9100
NJ	Pine Brook, Nu Horizons	201-882-8300
NM	Albuquerque, Bell Inds	505-292-2700
NY	Amityville, Nu Horizons	516-226-6000
NY	E. Rochester, Nu Horizons	716-248-5980
NY	Endicott, Marshall Ind.	607-785-2345
NY	Johnson City, Marshall Ind.	607-798-1611
NY	Rochester, Marshall Ind.	716-235-7620
NY	Smithtown, Vantage Comps	516-543-2000
NC	Raleigh, Reptron	919-870-5189
NC	Raleigh, Marshall Ind.	919-878-9882
OH	Dayton, Marshall Ind.	513-898-4480
OH	Dayton, Bell Inds	513-435-8660
OH	Solon, Marshall Ind.	216-248-1788
OH	Solon, Reptron	216-349-1415
OH	Worthington, Reptron Elctrns.	614-436-6675
OR	Beaverton, Bell Inds	503-635-6500
OR	Beaverton, Marshall Ind.	503-644-5050
PA	Pittsburgh, Marshall Ind.	412-788-0441
PA	Trevose, Bell Inds	215-953-2899
TN	Nashville, SMD Inc	615-331-6045
TX	Austin, Marshall Ind.	512-837-1991
TX	Carrollton, Marshall Ind.	214-233-5200
TX	Houston, Marshall Ind.	713-895-9200
TX	Richardson, Bell Inds	214-690-0466
TX	Sugarland, Jaco	713-240-2255
UT	Midvale, Bell Inds	801-255-9611
UT	Salt Lake City, Marshall Ind.	801-973-2288
UT	West Valley City, Added Value Elctrns	801-975-9500
WA	Bothell, Marshall Ind.	206-486-5747
WA	Redmond, Bell Inds	206-451-3883
WI	Waukesha, Marshall Ind.	414-797-8400
WI	Waukesha, Bell Ind.	414-547-8879
Can	Alberta, Calgary, ITT Multicomponents	403-273-2780
Can	Alberta, Edmonton, ITT Multicomponents	403-436-9555
Can	British Columbia, Burnaby, ITT Multicomponents	604-291-8866
Can	Manitoba, Winnipeg, ITT Multicomponents	204-697-2300
Can	Ont. Brampton, G.S. Marshall	416-458-8046
Can	Ontario, Concord, ITT Multicomponents	416-736-1144
Can	Ontario, Nepean, ITT Multicomponents	613-596-6980
Can	Que., Pointe Claire, G.S. Marshall	514-694-8142
Can	Quebec, St. Laurent, ITT Multicomponents	514-335-7697

FUJITSU MICROELECTRONICS, INC.,
Semiconductor Division, 3545 N. First St., San Jose,
California 95134-1804, Tel: 408-922-9000, FAX:
408-432-9044

Sales Office & Representatives

AL	Huntsville, CSR Electrns	205-533-2444
AZ	Scottsdale, Aztech Comp Sales, Inc.	602-991-6300
CA	Chula Vista, Solano Electrna (SONIKA)	619-424-9190
CA	Chula Vista, Solano Electrna (Sonika)	619-424-9190
CA	Granite Bay, Norcomp	916-791-7776
CA	Irvine, Fujitsu Microelec	714-724-8777
CA	Irvine, Infinity Sales	714-833-0300
CA	Irvine, Fujitsu Microelec	714-724-8777
CA	San Diego, Infinity Sales	619-535-9300
CA	Santa Clara, Fujitsu Microelec	408-982-1800
CA	Santa Clara, Norcomp	408-727-7707
CO	Boulder, Talisman Assoc.	303-444-7300
CO	Englewood, Fujitsu Microelec Inc	303-740-8880
CT	Cheshire, Connecticut Applied Tech	203-272-6564
FL	Altamonte Springs, Semtronic Assocs	407-831-8233
FL	Clearwater, Semtronic Assocs	813-461-4675

FL	Ft. Lauderdale, Semtronic Assocs	305-731-2484
GA	Atlanta, CSR Elctrns	404-396-3720
GA	Norcross, Fujitsu Microelec	404-449-8539
ID	Meridian, Intermountain Tech Mktg	208-888-6017
IL	Itasca, Beta Technology	708-250-9586
IL	Itasca, Fujitsu Microelec	708-250-8580
IN	Carmel, Valentine Assocs	317-846-0008
IN	South Bend, Valentine Assocs	219-288-7070
IA	Cedar Rapids, Electromec Sales	319-393-1637
KS	Olathe, Rothkopf & Assoc, Inc.	913-829-8897
KY	Henderson, Valentine Assocs	502-826-9444
MD	Towson, Arbotek Assoc	410-825-0775
MA	Waltham, Fujitsu Microelec	617-487-0029
MA	Waltham, 3D Sales	617-890-2221
MI	Farmington Hills, R.C. Merchant & Co	313-476-4600, 616-983-7378
MI	St. Joseph, RC Merchant & Co. Inc	616-983-7378
MN	Burnsville, Electromec Sales	612-894-8200
MN	Eagan, Fujitsu Microelec	612-454-0323
MO	St. Louis, Rothkopf & Assoc, Inc.	314-961-4485
NJ	Fairfield, Tech App. & Mkt (TAM)	201-575-4130
NJ	Marlton, BGR Assoc	609-983-1020
NY	Buffalo, Quality Comps	716-837-5430
NY	Hauppauge, Fujitsu Microelec	516-582-8700
NY	Manlius, Quality Comps	315-682-8885
NY	Rochester, Quality Comps	716-342-7229
NC	Indian Trail, CSR Electrns	704-882-3995
NC	Raleigh, CSR Electrns	919-878-9200
OH	Cincinnati, Stegman Blaine Mktg	513-729-1969
OH	Cleveland, Stegman Blaine Mktg	216-572-0003
OH	Vandalia, Stegman Blaine Mktg	513-890-7975
OR	Beaverton, L-Squared Ltd.	503-629-8555
OR	Beaverton, Fujitsu Microelec	503-690-1909
TN	Knoxville, CSR Electrns	615-637-0293
TX	Austin, Tech Mktg, Inc.	512-343-6976
TX	Carrollton, Tech Mktg, Inc.	214-387-3601
TX	Dallas, Fujitsu Microelec	214-233-9394
TX	Houston, Tech Mktg, Inc.	713-783-4497
UT	Salt Lake City, R-Squared Mtkg	801-595-0631
WA	Kirkland, L Squared Limited	206-827-8555
WI	Milwaukee, Beta Technology	414-543-6609
Can	Ont. Islington, Pipe-Thompson Ltd.	416-236-2355
Can	Ontario, Kanata, Pipe-Thompson Ltd.	613-591-1821
Intl	Germany, Dreieich-Buchschlag, Fujitsu Mikroelektronik, GmbH	011-49-6103-6900
Intl	Japan, Tokyo, Fujitsu Ltd.	011-81-3-3216-3211
Intl	Mexico, Guadalajara, Solano Electrna (SONIKA)	011-52-3647-4250
Intl	Mexico, Mexico City, Solano Electrns, S.A. De C.V.	011-52-5754-6480
Intl	Singapore, Fujitsu Microelec Asia PTE Ltd.	011-65-336-1600
Intl	Sweden, Solna, Fujitsu Microelec Ltd.	8-7646365
PR	Hato Rey, Semtronic Assocs.	809-766-0700

Distributors

AL	Huntsville, Reptron Elctrns	205-722-9500
AL	Huntsville, Marshall Inds	205-881-9235
AZ	Phoenix, Marshall Inds.	602-496-0290
AZ	Tempe, Insight Elctrns	602-829-1800
CA	Agoura Hills, Western Microtechnology	818-707-0731
CA	Calabasas, Marshall Inds	818-878-7000
CA	Camarillo, Milgray Elctrns	805-484-4055
CA	El Monte, Marshall Inds	818-307-6000
CA	Fountain Valley, Bell Microproduct	714-963-0667
CA	Irvine, Marshall Inds.	714-458-5365
CA	Irvine, Insight Elctrns	714-727-3291
CA	Irvine, Milgray Elctrns	714-753-1282
CA	Milpitas, Marshall Inds.	408-942-4600
CA	Orange, Western Microtechnology	714-637-0200
CA	Rancho Cordova, Marshall Inds	916-635-9700
CA	San Diego, Marshall Inds.	619-627-4140
CA	San Diego, Western Microtechnology	619-453-8430
CA	San Diego, Insight Elctns	619-587-1100
CA	San Jose, Bell Microproducts	408-451-9400
CA	San Jose, Merit Elctrns	408-434-0800
CA	Saratoga, Western Microtechnology	408-725-1660
CA	Sunnyvale, Insight Elctrns	408-720-9222
CA	Westlake Village, Insight Elctrns	818-707-2101
CO	Englewood, Insight Elctrns	303-649-1800
CO	Thornton, Marshall Inds.	303-451-8383
CT	Milford, Milgray Elctrns	203-878-5538
CT	Wallingford, Marshall Inds.	203-265-3822
FL	Altamonte Springs, Marshall Inds	407-767-8585
FL	Ft. Lauderdale, Reptron Elctrns.	305-735-1112
FL	Ft. Lauderdale, Marshall Inds	305-977-4880
FL	Lake Mary, Milgray Elctrns	407-321-2555
FL	St. Petersburg, Marshall Inds	813-573-1399
FL	Tampa, Reptron Elctrns	813-855-4656
GA	Norcross, Milgray Elctrns	404-446-9777
GA	Norcross, Marshall Inds.	404-923-5750
GA	Norcross, Reptron Elctrns	404-446-1300
IL	Northbrook, Classic Comps	708-272-9650
IL	Palatine, Milgray Elctrns	708-202-1900
IL	Schaumburg, Reptron Elctrns	708-882-1700
IL	Schaumburg, Marshall Inds	708-490-0155
IN	Indianapolis, Marshall Inds	317-297-0483
KS	Lenexa, Marshall Inds	913-492-3121
KS	Overland Park, Milgray Elctrns	913-236-8800
MD	Columbia, Milgray Elctrns	410-730-6119
MD	Columbia, Vantage Comps, Inc.	301-720-5100
MD	Silver Springs, Marshall Inds.	301-622-1118
MA	Billerica, Vantage Comps	508-667-2400
MA	Burlington, Western Microtechnology	617-273-2800
MA	Hopkinton, Interface Elctrns	508-435-0100
MA	Wilmington, Milgray Elctrns	508-657-5900
MA	Wilmington, Marshall Inds	508-658-0810
MA	Wilmington, Bell Microproducts	508-658-0222
MI	Livonia, Marshall Inds	313-525-5850
MI	Livonia, Reptron Elctrns	313-525-2700
MN	Edina, Marsh Elctrns	612-941-1130
MN	Minnetonka, Reptron Elctrns	612-938-0000
MN	Plymouth, Marshall Inds.	612-559-2211
MO	Bridgeton, Marshall Inds	314-291-4650
NJ	Clifton, Vantage Comps, Inc.	201-777-4100
NJ	Fairfield, Marshall Inds.	201-882-0320
NJ	Marlton, Milgray Elctrns	609-983-5010
NJ	Marlton, Western Micro	609-596-7775
NJ	Marlton, Interface Elctrns	609-988-5448
NJ	Mt. Laurel, Marshall Inds.	609-234-9100
NJ	Parsippany, Milgray Elctrns	201-335-1766
NY	Endicott, Marshall Inds.	607-785-2345
NY	Farmingdale, Milgray Elctrns	516-420-9800
NY	Pittsford, Milgray Elctrns	716-381-9700
NY	Rochester, Marshall Inds.	716-235-7620
NY	Smithtown, Vantage Comps, Inc.	516-543-2000
NC	Raleigh, Milgray Elctrns	919-790-8094
NC	Raleigh, Marshall Inds	919-878-9882
NC	Raleigh, Reptron Elctrns	919-870-5189
OH	Cleveland, Milgray Elctrns	216-447-1520
OH	Dayton, Marshall Inds.	513-898-4480
OH	Solon, Reptron Elctrns	216-349-1415
OH	Solon, Marshall Inds	216-248-1788
OR	Beaverton, Marshall Inds	503-644-5050
OR	Beaverton, Western Microtechnology	503-629-2082
TX	Austin, Marshall Inds	512-837-1991
TX	Dallas, Milgray Elctrns	214-248-1603
TX	Houston, Marshall Inds.	713-467-1666
TX	Richardson, Insight Elctrns	214-783-0800
TX	Richardson, Marshall Inds	214-705-0600
TX	Stafford, Milgray Elctrns	713-240-5360
UT	Murray, Milgray Elctrns	801-261-2999
UT	Salt Lake City, Marshall Inds	801-973-2288
WA	Bothell, Marshall Inds.	206-486-5747
WA	Kirkland, Western Microtechnology	206-828-2741
WA	Kirkland, Insight Elctrns	206-820-8100
WI	Milwaukee, Marsh Elctrns.	414-475-6000
WI	Waukesha, Marshall Inds	414-797-8400
Can	Alberta, Edmonton, Active Comps	403-438-2858
Can	Alberta, N.E.Calgary, Active Comps	403-291-5333
Can	British Columbia, Vancouver, Active Comps	604-294-1166
Can	Ont. Mississauga, Active Comps	416-612-9200
Can	Ont. Mississauga, Milgray Elctrns	416-678-0958
Can	Ontario, Bramton, Marshall Inds	416-458-8046
Can	Ontario, Ottawa, Active Comps	613-820-8313
Can	Quebec, Pointe Claire, Active Comps	514-694-7710
Can	Quebec, Pointe Claire, Marshall Inds	514-694-8142
Intl	Austria, Wien, Eljapex Handelsges mbH	222-861531
Intl	Austria, Wien, MHV/EBV Elektronik	222-838519
Intl	Belgium, Herstal, Eriat SA	41-271993
Intl	Belgium, Zaventem, MHV/EBV Elektronik	2-7209936
Intl	Denmark, Herlev, Nordisk Elektronik AS	42-842000
Intl	Denmark, Vantaa, Aspecs OY	90-5668686
Intl	France, Bievres Cedex, Elbatex	1-69412800
Intl	France, Montiqny le Bretonneux, F2S (Groupe ASAP)	1-30438233
Intl	France, Rungis Cedex, Microram	1-46868170
Intl	France, Trappes, F2S	1-30571854
Intl	Germany, Ottobrunn, Micro Halbleiter GmbH	89-6096068
Intl	Germany, Waldshut-Tiengen, Eljapex GmbH	7751-2035
Intl	Hong Kong, Causeway Bay, Famint (HK) Ltd.	5760130/5760146
Intl	Hong Kong, Kowloon, Mobicon Electrn Supplies	7801150/7801139
Intl	Ireland, Shannon, Allied Semi. Intl Ltd	61-61777
Intl	Italy, Bologna, Unidis Group Bologna	51-727252
Intl	Netherlands AH Capelle a/d Ljssel, P & T ELectronics b.v.	10-4501444
Intl	Nethrlands, Maarssenbroek, MHV/EBV Elektronik	3465-62353
Intl	Norway, Fjellhamar, Odin Electrns AS	2-703730
Intl	Portugal, Lisboa, Niposom J. Nabais LDA	1-894637
Intl	Singapore, Cony Electrns (S) PTE Ltd.	296-2111
Intl	Spain, Barcelona, Comelta S.A.	3-3007712
Intl	Spain, Madrid, Comelta S.A.	1-7543001
Intl	Sweden, Hagersten, Martinsson Elektronik A.B.	8-7440300
Intl	Switzerland, Wettingen, Eljapex AG	56-275-777
Intl	Taiwan, Taipei, Eplus Corp Ltd.	027548038
Intl	Taiwan, Taipei, Faimint (Taiwan) Co. Ltd.	02 5051963
Intl	United Kingdom, Gants Hills, Pronto Electrn Sys Ltd.	15-546222
Intl	United Kingdom, Hants, Hawke Comp Distrib	256-880800
Intl	United Kingdom, Middlesex, Hawke Comp Distribution	1-9797799

GALIL MOTION CONTROL, 1054 Elwell Court, Palo Alto, California 94303, Tel: 415-964-6494, TELEX: 171409, FAX: 415-964-0426

GE/INTERSIL, See Harris Semiconductor

GEC PLESSEY SEMICONDUCTORS, 1500 Green Hills Road, Scotts Valley, California 95066, Tel: 408-438-2900, FAX: 408-438-5576

Sales Office & Representatives

AL	Huntsville, Electramark Inc	205-830-4400
AZ	Scottsdale, Fred Board Assocs	602-994-9388
AZ	Tempe, GEC Plessey	602-491-0910
CA	Irvine, GEC Plessey	714-455-2950
CA	La Mirada, Select Elect.	714-739-8891
CA	San Jose, GEC Plessey	408-433-1030
CA	Scotts Valley, GEC Plessey	408-438-2900
CA	Thousand Oaks, Select Elctrns	805-492-2007
CA	Westlake Village, Select Elctrns	805-496-8877
CO	Littleton, GEC Plessey	303-798-0250
FL	Altamonte Springs, DHR Mktg., Inc.	407-331-1199
FL	Clearwater, DHR Mktg., Inc.	813-725-5262
FL	Maitland, GEC Plessey	407-539-1700
FL	Pompano, DHR Mktg., Inc.	305-972-9157
GA	Alpharetta, GEC Plessey	404-343-9904
GA	Norcross, Electramark Inc	404-446-7915
IL	Itasca, Micro Sls., Inc.	708-285-1000
IL	Oak Brook, GEC Plessey	708-573-7773
IN	Leslie M. DeVoe	317-842-3245
IA	Cedar Rapids, Lorenz Sls.	319-377-4666
KS	Overland Park, Lorenz Sls.	913-469-1312
KS	Wichita, Lorenz Sls.	316-721-0500
MD	Boring, GEC Plessey	301-833-2100
MD	Mitchellville, Walker Assocs	301-249-7145
MD	Westminster, Walker Assocs	301-876-9399
MA	Canton, Stone Comps	617-828-6569
MA	Dedham, GEC Plessey	617-320-9790
MA	Framingham, Stone Comps	508-875-3266
MA	Long Meadow, Stone Comps.	413-567-9075
MA	Newburyport, Stone Comps.	508-875-3266
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MN	Eden Prairie, High Technlg Sls	612-944-7274
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NJ	Cherry Hill, Metz Benham Assocs Inc	609-424-0404

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NY	Syracuse, Regan Compar	315-432-8232
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OH	Dayton, Scott Elec., Inc.	513-294-0539
OH	Westerville, Scott Elec., Inc.	614-882-6100
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TX	Austin, Oeler & Menelaides, Inc.	512-453-0275
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TX	Dallas, Oeler & Menelaides, Inc.	214-361-8876
WI	Brookfield, Micro Sls., Inc.	414-786-1403
Can	Ontario, Mississauga, GM Assoc., Inc.	416-671-8111
Can	Ontario, Richmond, GM Assoc., Inc.	613-838-4480
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Intl	Hong Kong, YES Products Ltd.	41-442416
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Intl	Malaysia, Adequip Enterprise Sdn Bhd	2423522
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NJ	Novi, Hamilton/Avnet Elctrns	313-347-4271
NJ	Parsippanny, Hamilton/Avnet Elctrns	201-515-5370
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NJ	Pine Brook, Arrow/Schweber Elctrns	201-227-7880
NJ	Plymouth, Hall-Mark Elctrns	313-416-5800
NM	Albuquerque, Hamilton/Avnet Elctrns	505-828-1058
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NY	Hauppauge, Arrow/Schweber Elctrns	201-231-1000
NY	Hauppauge, Hamilton/Avnet Elctrns	516-434-7421
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NC	Raleigh, Arrow/Schweber Elctrns	919-250-2081
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FL	Ft. Lauderdale, Hitachi America, Ltd.	305-491-6154
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MN	Bloomington, Hitachi America, Ltd.	612-896-3444
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FL	Coral Springs, CBC Electrns	305-755-1111
FL	Longwood, CBC Electrns	407-831-5380
FL	Tampa, CBC Electrns	813-969-1901
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IL	Glendale Heights, Synergistic Sls.	708-858-8686
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MI	Troy, C.B. Jensen & Assocs.	313-643-0506
MN	Minneapolis, Reptek	612-331-1212
NY	Babylon, Astrorep, Inc.	516-422-2500
NY	Victor, FSI Sys, Inc.	716-924-7510
NC	Cary, Group 2000 Sales, Inc	919-481-1530
OH	Cincinnati, Technlg Mktg Corp	513-271-3860
OH	Middleburg Heights, Technlg Mktg Corp	216-885-5544
OR	Beaverton, Advanced Tech. Mktg, Inc	503-643-8307
PA	Trevose, Omega Electrn Sales, Inc	215-244-4000
PA	Valley Forge, Integrated Circuit Sys, Inc	215-630-5300
TX	Austin, Impaq Sls.	512-335-9666
TX	Houston, Impaq Sls.	713-820-0288
TX	Irving, Impaq Sls.	214-650-0000
UT	Salt Lake City, Waugaman Assocs., Inc	801-261-0802
VA	Falls Church, S-J Chesapeake	703-533-2233
WA	Redmond, Advanced Tech. Mktg. Inc	206-869-7636
WI	Milwaukee, KMA Sales	414-259-1771
Can	Ont., Ottawa, Dynasty Comps	613-596-9800
Intl	Belgium, Zaventem, ACAL Auriema	720-59-83
Intl	France, Sevres Cedex, Tekelec Airtronic	01-46-23-24-25
Intl	Germany, Hanover, Topas Electrn GmbH	511-13-12-17
Intl	Germany, Kirchheim/Tech, Scantec GmbH	70-2-15-40-27
Intl	Germany, Munchen, Electrn 2000 Bauelemente GmbH	89-45110-01
Intl	Germany, Planegg, Scantec GmbH	089-8-59-80-21
Intl	Hong Kong, Kowloon, RTI Inds. Co. Ltd.	852-795-7421
Intl	Hong Kong, Kwai Chung, N.T., Electrocon Prods, Ltd	852-481-6022
Intl	Italy, Milan, Comprel S.R.L.	02-612-8486
Intl	Italy, Milan, Comprel S.P.A.	362-553-991
Intl	Japan, Osaka, Nichimen Electrn Comp Corp	06-539-5430
Intl	Japan, Tokyo, Micro Summit K.K.	03-3258-5531
Intl	Korea, Seoul, Acetronix	2-796-4561
Intl	Netherlands, Eindhoven, ACAL Auriema	040-502-602
Intl	Singapore, Electec Pte Ltd.	65-294-8389
Intl	Taiwan, Taipei ROC, Maxtek Technlg Co Ltd	2-713-0209
Intl	Taiwan, Taipei, ROC, Princeton Techngl Corp	2-917-8856
Intl	United Kingdom, Hants, Amega Technlg	0256-330-301
PR	Ponce, Sales Engnr Concepts, Inc	809-841-4220

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Sales Office & Representatives

AL	Huntsville, IDT	205-721-0211
AZ	Scottsdale, Western High Tech. Mktg.	602-860-2702
CA	Encino, IDT	818-981-4438
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Intl	Germany, Heimstetten, Jermyn GmbH	49-89/909903-0
Intl	Germany, Herrenberg, Jermyn GmbH	49-7032/203-01
Intl	Germany, Kirchheim, Scantec GmbH	49-70-215-4027
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Intl	Germany, Norderstedt, Jermyn GmbH	49-40/5282041
Intl	Germany, Numberg, Jermyn GmbH	49-911/425095
Intl	Germany, Planegg, Scantec GmbH	49-859-8021
Intl	Germany, Quickborn, Topas Electrn GmbH	49-4106-73097
Intl	Germany, Ruckersdorf, Scantec GmbH	49-91-157-9529
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Intl	United Kingdom, Surrey, IDT	44-0372-363-339/734
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CO	Englewood, Hall-Mark Electrns	303-790-1662
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FL	Pompano Beach, Hall-Mark Electrns	305-971-9280
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GA	Norcross, Hall-Mark Electrns	404-447-8000
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IL	Woodale, Hall-Mark Electrns	312-860-3800
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IN	Indianapolis, Hall-Mark Electrns	317-872-8875
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KS	Lenexa, Hall-Mark Electrns	913-888-4747
KY	Lexington, Hamilton/Avnet	606-259-1475
MD	Columbia, Hall-Mark Electrns	301-988-9800
MD	Columbia, Hamilton/Avnet	301-995-3500
MA	Billerica, Hall-Mark Electrns	617-935-9777
MA	Peabody, Hamilton/Avnet	617-531-7430
MI	Grand Rapids, Hamilton/Avnet	616-243-8805
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MI	Livonia, Hamilton/Avnet	313-522-4700
MN	Bloomington, Hall-Mark Electrns	612-941-2600
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NJ	Pinebrook, Hall-Mark Electrns	201-882-9773
NM	Albuquerque, Hamilton/Avnet	505-765-1500
NY	Hauppauge, Hamilton/Avnet	516-434-7421
NY	Rochester, Hall-Mark Electrns	716-244-9290
NY	Rochester, Hamilton/Avnet	716-475-9130
NY	Ronkonkoma, Hall-Mark Electrns	516-737-0600
NY	Smithtown, Vantage Comps	516-543-2000
NY	Syracuse, Hamilton/Avnet	315-437-2641
NY	Westbury, Hamilton/Avnet Export	516-997-6868
NC	Raleigh, Hall-Mark Electrns	919-872-0712
NC	Raleigh, Hamilton/Avnet	919-878-0810
OH	Dayton, Hamilton/Avnet	513-439-6700
OH	Solon, Hall-Mark Electrns	216-349-4632
OH	Solon, Hamilton/Avnet	316-349-5100, 800-362-6211
OH	Westerville, Hamilton/Avnet	614-882-7004
OH	Worthington, Hall-Mark Electrns	614-888-3313, 800-282-3918
OR	Lake Oswego, Hamilton/Avnet	503-635-8157
PA	Pittsburgh, Hamilton/Avnet	412-281-4150
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TX	Austin, Hamilton/Avnet	512-837-8911
TX	Dallas, Hall-Mark Electrns	214-553-4300
TX	Houston, Hall-Mark Electrns	713-781-6100
TX	Irving, Hamiltong/Avnet	214-550-6111
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UT	Salt Lake City, Hamilton/Avnet	801-972-2800
UT	West Valley City, Hall-Mark Electrns	801-972-1008
WA	Bellevue, Hamilton/Avnet	206-643-3950
WI	New Berlin, Hall-Mark Electrns	414-797-7844
WI	Waukesha, Hamilton/Avnet	414-784-4510
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Can	Alberta, Calgary, Zentronics	403-272-1021
Can	Alberta, Edmonton, Zentronics	403-468-9306
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Can	British Columbia, Richmond, Zentronics	604-273-5575
Can	Manitoba, Winnipeg, Zentronics	204-694-1957
Can	Ontario, Brampton, Zentronics	416-451-9600
Can	Ontario, Mississauga, Hamilton/Avnet	416-677-7432
Can	Ontario, Nepean, Hamilton/Avnet	613-226-1700
Can	Ontario, Nepean, Zentronics	613-226-8810
Can	Quebec, Ville St. Laurent, Zentronics	514-737-5212
Can	Saskatchewan, Saskatoon, Zentronics	306-955-2207

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INTEGRATED SILICON SOLUTION INC., 680 Almanor Avenue, Sunnyvale, California 94086, Tel: 408-733-4774, FAX: 408-245-4774

Sales Office & Representatives

Intl	Japan Chiyoda-ku, Tokyo, Micro Summit K.K.	011-81-3-3258-5531
Intl	Japan, Kanagawa, Teksel Co Ltd	011-81-44-812-7430
Intl	Japan, Tokyo, Kawasho Corp	011-81-3-3578-5190
Intl	Taiwan, Taipei, ISSI/Taiwan	011-886-2-397-9070

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FL	Ft. Lauderdale, Nu Horizons	305-735-2555
FL	Miami, All American	305-621-8282
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MA	Wakefield, Nu Horizons	617-246-4442
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TX	Dallas, Integraph Corp.(West Reg. Off.)	214-669-9680
TX	Houston, Intergraph Corp.	713-978-7337
TX	San Antonio, Intergraph Corp.	512-646-7711
VA	Richmond, Intergraph Corp.	804-270-4890
VA	Washington D.C., Intergraph Corp. (Northeast Reg. Off.)	703-264-5600
WA	Seattle, Intergraph Corp.	206-455-9945
WV	Charleston, Intergraph Corp.	304-346-7044
WI	Brookfield, Intergraph Corp.	414-335-1900
Intl	Alberta, Calgary, Intergraph Sys, Ltd.	403-250-6100
Intl	Alberta, Edmonton, Integraph Sys, Ltd.	403-424-7431
Intl	Australia, Adelaide, Intergraph Corp Pty., Ltd.	61-8-239-0413
Intl	Australia, Brisbane, Intergraph Corp Pty., Ltd.	61-7-239-8905
Intl	Australia, Melbourne, Intergraph Corp Pty., Ltd.	61-3-859-9421
Intl	Australia, Perth, Intergraph Corp Pty., Ltd.	61-9-368-2522
Intl	Australia, Sydney, Intergraph Corp Pty., Ltd.	61-2-888-9900
Intl	Belguim, Brussels, Intergraph (Benelux) BV	32-2-217-5122
Intl	British Columbia, Vancouver, Intergraph Sys, Ltd.	604-434-2677
Intl	China, Bejing, Intergraph China Inc.	86-1-831-6262
Intl	Cyprus, Larnaca, Intergraph Middle East Ltd.	357-41-28700
Intl	Denmark, Frederiksberg, Intergraph CAD/CAM (Danmark) A/S	45-1-875888
Intl	England, Swindon, Advanced Processor Division	44-793-619999
Intl	Finland, Espoo, Intergraph (Finland) Oy	358-0-455-4744
Intl	France, Cedex, Intergraph (France) S.A R.L.	33-1-45603000
Intl	France, Cedex, Advanced Processor Division	33-1-45603000
Intl	France, Lyon, Intergraph (France) S.A.R.L.	33-16-72345939
Intl	Hong Kong, Intergraph Graphics Sys	852-5-284012
Intl	Italy, Milanofiori, Intergraph Italia S.p.A.	39-2-824-3043
Intl	Japan, Tokyo, Nihon Intergraph K.K.	81-03-576-1881
Intl	Korea, Seoul, Intergraph Korea, Inc.	82-2-784-8725
Intl	Mexico, Mexico City, Intergraph de Mexico, S.A. de C.V.	905-531-0862
Intl	Netherlands, Aalsmeer, Intergraph (Benelux) BV	31-2977-21511
Intl	Netherlands, Hoofddorp, Intergraph Europe, Inc.	31-2503-66333
Intl	New Zealand, Wellington, Intergraph Corp (N.Z.), Ltd.	64-4-853-304
Intl	Norway, Asker, Intergraph (Norge) A/S	47-2-787980
Intl	Ontario, Mississauga, Intergraph Sys, Ltd.	416-625-2081
Intl	Ontario, Ottawa, Intergraph Sys, Ltd.	613-230-8385
Intl	Quebec, Montreal, Intergraph Sys, Ltd.	514-766-1292
Intl	Singapore, Intergraph Sys. S-E Asia (Pte), Ltd.	65-733-9511
Intl	Spain, Barcelona, Intergraph (Espana) S.A.	34-3-200-5299
Intl	Spain, Bilbao Vizcaya, Intergraph (Espana) S.A.	34-94-463-4066
Intl	Spain, Madrid, Intergraph (Espana) S.A.	34-1-202-4541
Intl	Sweden, Tab, Intergraph (Scandinavia) AB	46-8-792-1150
Intl	Switzerland, Zurich, Intergraph (Switzerland) AG	1-3025202
Intl	Taiwan, Taipei, Intergraph Corp Taiwan	886-2-716-4458
Intl	United Kingdom, Derby, Intergraph (UK) Ltd.	44-332-384815
Intl	United Kingdom, Swindon, Intergraph (UK) Ltd.	44-793-619999
Intl	Venezuela, Caracas, Intergraph Servicios de Venezuela C.A.	58-2-925552
Intl	West Germany, Intergraph (Deutschland) GmbH	49-211-742076
Intl	West Germany, Frankfurt, Intergraph (Deutschland) GmbH	49-069-664001-0
Intl	West Germany, Haar, Advanced Processor Division	49-89-461040
Intl	West Germany, Hamburg, Intergraph (Deutschland) GmbH	49-40-630-4035
Intl	West Germany, Munich, Intergraph (Deutschland) GmbH	49-89-461040
Intl	West Germany, Stuttgart, Intergraph (Deutschland) GmbH	49-711-7287230

INTERNATIONAL CMOS TECHNOLOGY,

2123 Ringwood Ave, San Jose, California 95131, Tel: 408-434-0678, TWX: 910-997-1531, FAX: 408-432-0815

Sales Office & Representatives

AL	ACM	205-881-5493
CA	Zeustec Sales	408-987-0164
CA	Aliso Viejo, Pro Assocs	714-588-2700
CA	San Jose, ICT (Western Area Sales)	408-434-0678
CO	Parker Webster Co.	303-841-4888
CT	CTC	203-421-5690
FL	Casselberry, AMS	407-831-2505
FL	Tarpon Springs, AMS	813-938-3073
FL	West Palm Bch, AMS	407-689-3860
GA	ACM	404-448-7025
GA	Kennesaw, ICT (Southern Area Sales)	404-516-0194
IL	Martan	708-303-5660
IL	Schaumburg, ICT (Northern Area Sales)	708-303-0012
IA	Gibb Tech. Sales	816-483-6785
KS	Gibb Technology Sls	913-451-6785
MD	DGR, Inc.	301-583-1360
MA	CTC	617-444-1995
MN	Customer 1st	612-533-5604
NH	CTC	617-835-3370
NH	Londonberry, ICT (Northeast Area Sales)	603-432-1722
NJ	Nexus Tech. Sales	201-947-0151
NY	Long Island, Nexus Tech. Sales Inc	201-947-3186
NY	Upper State, Zimmerman Sales	716-381-3186
NC	Benchmark	919-850-0633
OH	Centerville, Omega	513-434-5507
OH	Cleveland, Omega	216-446-9797
OR	Electra	503-643-5074
PA	Nexus Tech. Sales	215-675-9600
TX	Austin, Gardin-Moore	512-794-2900
TX	Plano, Gardin-Moore	214-985-1193
TX	Stafford, Gardin-Moore	713-240-6767
UT	Parker Webster Co.	801-266-9939
VT	CTC	617-749-6881
WI	Martan	414-241-4955
Can	B.C., Vancouver, Weiss Co	604-873-1112
Can	Manitoba, Winnipeg, Weiss Co	204-772-3665
Can	Ontario, Ottawa, Weiss Co	613-225-1810
Can	Ontario, Toronto, Weiss Co	416-673-0011
Can	Quebec, Montreal, Weiss Co	514-685-6644
Intl	Australia, Reptechnic	61-2-953-9844
Intl	Austria, Tekelec	49-89-51640
Intl	Austria, USE	49-089-33-92-92
Intl	Denmark, PRC Comps	45-86-601160
Intl	Finland, Aberni Oy Ab	35-80-755-6722
Intl	France, Microel	33-1-69-07-08-24
Intl	Germany, USE	49-089-33-92-92
Intl	Germany, Tekelek	49-89-51640
Intl	Hong Kong, Actron	852-727-3978
Intl	Israel, Seg Tech	972-3-556-7548
Intl	Italy, Space Rep	39-2-9510945
Intl	Italy, IDAC	39-49-8075616
Intl	Japan, Tokyo Denshi Hanbai Co. Ltd.	81-03-3348-3401
Intl	Japan, Sanei Electrn Industry	81-426-44-7338
Intl	Korea, Acetronix	82-2-796-4561
Intl	Korea, Helbon	82-2-525-5091
Intl	Liechtenstein, Eurodis Electrn AG	41-1-843-3111
Intl	Malaysia, Crypton Technlg	65-270-3811
Intl	Netherlands, Acal Auriema	31-40-502602
Intl	New Zealand, Reptechnic	61-2-953-9844
Intl	Norway, PRC Comps	45-86-601160
Intl	Singapore, Crypton Technlg	65-270-381
Intl	Spain, Anatronic S.A.	34-1-542-4455
Intl	Sweden, AB Ingeniorsfirman Titan	46-8-644-7260
Intl	Switzerland, Eurodis Electrn AG	41-1-843-3111

Intl	Taiwan, Chesen	886-02-916-1299
Intl	Taiwan, Mitsutech	886-02-712-6572
Intl	Thailand, Crypton Techngl	65-270-381
Intl	United Kingdom, Sequoia Tech	44-734-311822

Distributors

AL	Huntsville, All American	205-837-1555
AL	Huntsville, Future	205-830-2322
AL	Huntsville, Nu Horizons	205-722-9330
AZ	Phoenix, Future	602-968-7140
AZ	Tuscon, Future	602-882-0808
CA	Agoura Hills, Western Microtechnology	818-707-0377
CA	Chatsworth, Future	818-772-6240
CA	Irvine, Future	714-250-1414
CA	Los Angeles, All American	310-320-0240
CA	Los Angeles, Milgray	805-484-4055
CA	Orange, Western Microtechnology	714-637-0200
CA	Orange, Milgray	714-753-1282
CA	San Diego, Western Microtechnology	619-453-8430
CA	San Diego, All American	619-458-5850
CA	San Diego, Future	619-625-2800
CA	San Jose, JACO Elctrns	408-432-9290
CA	San Jose, All American	408-943-1200
CA	San Jose, Future	408-434-1122
CA	San Jose, Milgray	408-456-0900
CA	Saratoga, Western Microtechnology	408-725-1660
CA	Tustin, JACO Elctrns	714-258-9003
CA	Westlake, JACO Elctrns	805-495-9998
CO	Lakewood, Future	303-421-0123
CT	Bethel, Future	203-743-9594
CT	Milford, Milgray	203-878-5538
CT	Monroe, Nu Horizons	203-265-0162
FL	Altamonte Springs, Nu Horizons	407-831-8008
FL	Altamonte Springs, Future	407-767-8414
FL	Altamonte Springs, Vantage	407-682-1199
FL	Coral Springs, JACO Elctrns	305-341-8280
FL	Ft. Lauderdale, Nu Horizons Elec. Corp.	305-735-2555
FL	Lake Mary, Milgray	407-321-2555
FL	Largo, Future	813-530-1222
FL	Longwood, Analytic Methods	407-831-0005
FL	Sunrise, All American	305-572-7999
GA	Norcross, Future	404-441-7676
GA	Norcross, Milgray	404-446-9777
GA	Norcross, Nu Horizons	404-416-8666
IL	Des Plaines, Advent	708-297-6200
IL	Hoffman Estates, Future	708-882-1255
IL	Palatine, Milgray	708-202-1900
IN	Indianapolis, Advent	317-872-4910
IA	Cedar Rapids, Advent	319-363-0221
KS	Overland Park, Milgray	913-236-8800
MD	Baltimore, Vantage	410-720-5100
MD	Columbia, Nu Horizons	410-995-6330
MD	Columbia, JACO Elctrns	301-995-6620
MD	Columbia, Vantage	410-621-8555
MD	Columbia, Future	410-290-0600
MD	Columbia, Milgray	301-995-6169
MA	Andover, Vantage	508-663-7474
MA	Bolton, Future	508-779-3000
MA	Burlington, Western Microtechnology	617-273-2800
MA	Tewksbury, JACO Elctrns	508-640-0010
MA	Wakefield, Nu Horizons Elec. Corp.	617-246-4442
MA	Wakefield, All American	617-246-2300
MA	Wilmington, Milgray	508-657-5900
MI	Farmington Hills, Advent	313-477-1650
MI	Livonia, Future	313-261-5270
MN	Eden Prairie, Future	612-944-2200
MO	St. Louis, Future	314-469-6805
NJ	Clifton, Vantage Comps	201-777-4100
NJ	Delaware Valley, Milgray	609-983-5010
NJ	Marlton, Western Microtechnology	609-596-7775
NJ	Mt. Laurel, Nu Horizons	609-231-0900
NJ	Parsippany, Future	201-299-0400
NJ	Parsippany, Milgray	201-335-1766
NJ	Pine Brook, Nu Horizons	201-882-8300
NM	Albuquerque, Future	505-764-9470
NY	Amityville, Nu Horizons	516-226-6000
NY	Farmingdale, Milgray	516-420-9800
NY	Hauppauge, Future	516-234-4000
NY	Pittsford, Milgray	716-381-9700
NY	Rochester, Nu Horizons	716-292-0777
NY	Rochester, Future	716-272-1120
NY	Ronkonkoma, All American	516-981-3935
NY	Smithtown, Vantage Comps	516-543-2000
NY	Syracuse, Future	315-451-2371
NC	Concord, Future	704-455-9030
NC	Raleigh, Milgray	919-790-8094
NC	Raleigh, JACO Elctrns	919-876-7767
NC	Raleigh, Future	919-790-7111
OH	Cleveland, Milgray	216-447-1520
OH	Mayfield Heights, Future	216-449-6996
OH	Solon, Nu Horizons	216-349-2008
OR	Beaverton, Western Microtechnology	503-629-2082
OR	Beaverton, Future	503-645-9454
PA	Marlton, Future	609-596-4080
PA	Mt. Laurel, Nu Horizons	215-557-6450
TX	Austin, JACO Elctrns	512-835-0220
TX	Dallas, Milgray	214-248-1603
TX	El Paso, Future	915-595-1000
TX	Houston, Future	713-556-8696
TX	Richardson, JACO Elctrns	214-234-5565
TX	Richardson, All American	214-231-5300
TX	Richardson, Future	214-437-2437
TX	Stafford, JACO Elctrns	713-240-2255
TX	Stafford, Milgray	713-240-5360
UT	Murray, Milgray	801-261-2999
UT	Salt Lake City, All American	801-261-4210
UT	Salt Lake City, Future	801-972-8489
WA	Bothell, Future	206-489-3400
WA	Columbia, Vantage	410-621-8555
WA	Kirkland, Western Microtechnology	206-881-6737
WI	Waukesha, Future	414-786-1884
WI	West Allis, Advent	414-475-6860
Can	Alb., Calgary, Future	403-250-5550
Can	Alb., Edmonton, Future	403-438-2858
Can	B.C., Vancouver, Future	604-294-1166
Can	Manitoba, Winnipeg, Future	204-786-7711
Can	Ont., Toronto, Milgray	416-678-0958
Can	Ontario, Ottawa, Future	403-250-5550
Can	Ontario, Toronto, Future	416-612-9200
Can	Que., Montreal, Milgray	514-426-5900
Can	Que., Quebec City, Future	418-877-6666
Can	Quebec, Montreal, Future	514-694-7710
PR	Analytic Methods	407-831-0005

INTERNATIONAL MICROCIRCUITS, INC.,

525 Los Coches St., Milpitas, California 95035, Tel: 408-263-6300, TWX: 910-338-2032, FAX: 408-263-6571

Sales Office & Representatives

AZ	Scottsdale, Tusar	602-998-3688
CA	Escondido, Eagle Tech Sales	619-743-6550
CA	Irvine, Spectrum Rep Co.	714-453-1525
CA	Santa Clara, Premier Tech Sls	408-736-2260
CA	Westlake Village, Spectrum Rep Co.	818-706-2919
CO	Denver, West, Inc.	303-477-8180
FL	Coral Springs, Graham Assocs., Inc.	305-341-5102
FL	Dade City, Graham Assocs., Inc	904-523-0996
FL	Indialantic, Graham Assocs., Inc.	407-773-6631
FL	Winter Garden, Graham Assocs., Inc.	407-656-9369
ID	Meridian, West, Inc.	208-888-6227
IN	Indianapolis, Luebbe Sales Co.	317-845-5880
IA	Cedar Rapids, C.H. Horn & Assoc.	319-393-8703
MD	Columbia, Rep-Tron	301-995-6322
MA	Needham, Apex Assoc.	617-444-8070
MI	Farmington Hills, Luebbe Sales	313-489-8828
MN	Minneapolis, Comps Group	612-374-1250
NJ	Hasbrouck Heights, Comp-Tech Sales	201-288-7400
NJ	Mt. Laurel, Wyck Mktg	609-727-1070
OH	Cincinnati, Luebbe Sales Co.	513-530-0600
OH	Dayton, Luebbe Sales Co.	513-438-0490
OH	Westlake, Luebbe Sales Co.	216-899-0071
OK	Tulsa, Advanced Tech Sales	918-664-0482
OR	Lake Oswego, Salestech Assoc.	503-636-9559
TX	Austin, Advanced Tech Sales	512-467-9209
TX	Dallas, Advanced Tech Sales	214-340-1300
TX	Houston, Advanced Tech Sales	713-440-3888
WA	Redmond, Salestech Assoc.	206-869-5412
Can	Quebec, Montreal, Eli Manis	514-484-2923
Intl	Germany, Eurocomp Electronik GmbH	011-49-06031-61076
Intl	Hong Kong, Kowloon, Tekcomp Elctrns Ltd	011-852-710-8121
Intl	Isreal, Herzeliya, Advanced Semiconductor Tech (AST)	011-972-52-583355
Intl	Italy, Milano, Celte SRL	011-39-02-2666295
Intl	Japan, Teksel Co., Ltd	011-81-44-812-7430
Intl	Korea, Seoul, D & S Corp	011-82-2-575-4490
Intl	Singapore, Taiga Elctrns PTE Ltd	011-65-741-8696
Intl	Spain, Barcelona, Semiconductors, S.A.	
Intl	Sweden, Ginsbury Elctrn AB	
Intl	Taiwan, Taipei, Mictronics Intl Corp	011-886-2-709-7626
Intl	U.K., Profile	011-44-256704695

INTERNATIONAL MICROELECTRONIC

PRODUCTS, 2830 North First Street, San Jose, California 95134, Tel: 408-434-1489, FAX: 408-434-0335

Sales Office & Representatives

AL	Huntsville, Electrn Sales, Inc.	205-533-1735
CA	Irvine, Spectrum Rep Co	714-453-1525
CA	San Jose, IMP CSPG Sales	408-434-1277
CA	San Jose, IMP ASSP Sales	408-434-1444, 215-643-3473
CA	Santa Clara, TMR Sales	408-562-0760
CA	Westlake Village, Spectrum Rep Co	818-706-2919
CO	Denver, Promo Tech Sls	303-692-8484
FL	Palm Harbor, Sigma Tech Assoc	813-789-5522
GA	Norcross, Electrn Sales, Inc.	408-448-6554
IL	Elgin, Gassner & Clark Co.	708-695-9540
MN	South St. Paul, Northport Engnr, Inc	612-457-8000
NJ	Marlton, BGR Assoc.	609-983-1020
NJ	Teaneck, Strategic Sales, Inc.	201-833-0099
NY	Fairport, Technology Sales, Inc	716-223-7500
NC	Cary, Electrn Sales, Inc.	919-467-8486
NC	Iron Station, Electrn Sales, Inc	704-735-9667
UT	Bountiful, Promo Tech Sls/Anderson Assoc	801-292-8991
Intl	China, Shanghai, United Vision Inc.	011-21-439-1391 x3203
Intl	So. Africa, Pretoria, So. African Microelectronic Sys	011-27-12-736021

INTERPOINT CORPORATION,

10301 Willows Road, Redmond, Washington 98073, Tel: 206-882-3100, FAX: 206-882-1990

Sales Office & Representatives

AL	Huntsville, The Novus Group	205-534-0044
AZ	Tempe, Gassner & Clark Co.	602-968-9037
CA	Los Altos, Cain-White & Co Inc	415-948-6533
CA	San Diego, Varigon San Diego	619-576-0100
CA	San Jose, Prospect Technlg Corp	408-252-6836
CA	Santa Clara, Hanaro U.S.A. Inc/HASA	408-986-1188
CA	Woodland Hills, Varigon Inc.	818-594-5080
CO	Parker, Technology Mktg Assocs.	303-841-3435
CT	Riverside, Howard C. Jappe Co	914-937-4845
FL	Deerfield Beach, Milano Brothers Intl	305-420-5000
FL	Lighthouse Point, Jack Krutek & Assocs.	305-783-2501
FL	Maitland, Jack Krutek & Assocs.	407-628-4837
GA	Norcross, The Novus Group	404-263-0320
IL	Elgin, RHI Sls	708-888-0099
IL	Itasca, Micro Sales Incorp.	708-285-1000
IN	Ft.Wayne, Corrao Marsh, Inc.	219-482-2725
IN	Greenfield, Corrao Marsh, Inc.	317-462-4446
IA	Cedar Rapids, Midwest Tech Sales	319-377-1688
KS	Goddard, Midwest Tech Sales	316-794-8565
KS	Lenexa, Midwest Tech Sales	913-888-5100
MD	Marriotsville, Neal Deoul Assocs.	410-795-5775
MD	Owings Mills, Neal Deoul Assocs.	410-363-4311
MA	Wakefield, Howard C. Jappe Co.	617-245-9359
MN	Minneapolis, Intertec Assocs.	612-921-8443
MO	Earth City, Midwest Tech Sales	314-298-8787
NJ	Flanders, K & R Engnr	201-584-5235
NY	Buffalo, Quality Comps	716-837-5430
NY	Manlius, Quality Comps	315-682-8885
NY	Rochester, Quality Comps	716-342-7229
NY	Utica, Quality Comps	315-865-5249
NC	Cary, The Novus Group	919-460-7771
OH	Cleveland, Arthur H. Baier	216-292-7500
OH	Dayton, Arthur H. Baier	513-233-0087
OH	West Chester, Arthur H. Baier	513-779-2395
OH	Worthington, Arthur H. Baier	614-764-1144
PA	Downingtown, Yax Assocs	215-458-8967
PA	Piperville, Yax Assocs.	215-766-2100
PA	Pittsburgh, Arthur H. Baier	412-367-7799
PA	Red Lion, Neal Deoul Assocs	717-244-6654

TX	Houston, Kite Electrns	713-469-6729
TX	Irving, Kite Electrns	214-986-0321
VA	Arlington, Neal Deoul Assocs	703-553-2600
VA	Williamsburg, Neal Deoul Assocs	804-229-7280
WI	Elgin, RHI Sls	708-888-0099
Can	Alb. Calgary, Cana Rep Group Inc.	403-255-0294
Can	British Columbia, Cana Rep Group Inc.	604-599-1232
Can	Ont. Willowdale, Cana Rep Group Inc.	416-250-6683
Can	Que., Montreal, Cana Rep Group Inc.	514-276-4477
Intl	Australia, Box Hill, Vic, NSD Australia	011-613-890-0970
Intl	Denmark, Copenhagen, Advanced Electrn A/S	011-45-3119-4433
Intl	Finland, Helsinki, Mespek OY	011-358-0-3511800
Intl	France, Saint Gratien, Interpoint SARL	011-33-1-34-28-2387
Intl	Germany, Nauheim, Emtron Electrn Vertriebs GmbH	011-49-6152-6003
Intl	Hong Kong, Wanchai, Excelpoint Co Ltd	011-852-8339013
Intl	India, Baner, Pune, Irys Engrg Svcs	011-91-212-339836
Intl	Israel, Petah Tikva, Boran Technlgs Ltd	011-97-2393-45171
Intl	Italy, Bareggio (MI), Milano Brothes Intl	011-39-2-9036-0561
Intl	Italy, Corsico (MI), Milano Brothers Intl	011-39-2486-01751
Intl	Italy, Rome, Milano Brothers Intl	011-39-6-2354913
Intl	Italy, Sesto S. Gioranni (MI), Milano Brothers Intl	011-39-2-2485125
Intl	Japan, Yokohama, Macnica	011-81-45-939-6140
Intl	Korea, Seoul, Duru Elctrns/Hanaro Corp	011-82-8-516-1144
Intl	Netherlands, Oosterhout	011-31-1620-81600
Intl	Norway, Oslo, Eltron A/S	011-47-2-500650
Intl	Singapore, Excelpoint Sys (PTE) Ltd	011-65-284-8537
Intl	Spain, Madrid, Solcer Electrna S.A.	011-34-1-4031163
Intl	Sweden, Spanga, Egevo AB	011-46-8-7959650
Intl	Switzerland, Dietikon AZ, Altrac	011-41-1-7414644
Intl	Taiwan, ROC Kaohsiung, Micra Taiwan Corp	011-886-7811-2133
Intl	Taiwan, ROC Taipei, Prospect Technlg Corp	011-886-02-8205353
Intl	Turkey, Ankara, Bupat Bilgisayar Ltd	011-90-4-417-0716
Intl	Turkey, Istanbul, Bupat Bilgisayar Ltd	011-90-1-345-7831
Intl	U.K., Fleet, Hampshire, Interpoint (U.K.) Ltd	011-44-252-81-5577

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PA (609) 231-0900
OH (216) 349-2006
FL (305) 735-2555
No.FL (407) 831-8008
GA (404) 416-8666
AL (205) 722-9330
INT'L (201) 882-4290
ISOCOM

ISOCOM INCORPORATED, 256 E. Hamilton Avenue, Suite H, Campbell, California 95008, Tel: 408-370-2212

ITC MICROCOMPONENTS INC., 18440-57 Avenue, Edmonton, Alberta, Canada T6M 2Y1, Tel: 1-403-486-2377, FAX: 1-403-486-2377

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NJ (201) 882-8300
MA (617) 246-4442
No.NY (716) 292-0777
MD (410) 995-6330
PA (609) 231-0900
OH (216) 349-2006
FL (305) 735-2555
No.FI (407) 831-8008
GA (404) 416-8666
AL (205) 722-9330
INT'L (201) 882-4290
IXYS
SEMICONDUCTOR

IXYS CORPORATION, 3540 Bassett St, Santa Clara, California 95054-2704, Tel: 408-982-0700, FAX: 408-496-0670

Sales Office & Representatives

AL	Huntsville, EMA, Inc	205-830-4030
AZ	Tempe, EDS	602-438-1547
CA	IXYS (Western Region)	619-597-7576
CA	La Mirada, Select Electrns	714-739-8891
CA	San Diego, Pro Sales	619-467-7150
CO	Denver, Moss Mktg	303-340-8535
CT	Guilford, SJ-New England	203-458-7558
FL	Altamonte Springs, Tech Sales Specialists	407-332-0067
FL	Boca Raton, Tech Sales Specialists	407-391-3718
FL	Clearwater, Tech Sales Specialists	813-460-9570
GA	Roswell, EMA, Inc	404-992-7240
IL	Schaumburg, Martan, Inc	708-303-5660
IN	Ft. Wayne, R.O. Whitesell & Assoc.	219-489-0588
IN	Kokomo, R.O. Whitesell & Assoc	317-457-9127
KY	Versailles, R.O. Whitesell & Assoc	606-873-1182
MD	Rockville, Marktron, Inc	301-251-8990
MA	IXYS (Eastern Region)	617-235-2600
MA	Wenham, SJ-New England	508-468-5057
MI	Grand Blanc, R.O. Whitesell & Assoc	313-695-0770
MI	Grand Rapids, R.O. Whitesell & Assoc	616-942-5420
MI	Southfield, R.O. Whitesell & Assoc	313-352-5454
MI	St. Joseph, R.O. Whitesell & Assoc	616-983-7337
MN	Minneapolis, R.W. Marshall Co., Inc	612-929-0457
NM	Alburquerque, Nelco Electronix	505-293-1399
NY	Rochester, Apex Association	716-272-7040
NY	Rockville Center, S.J. Assocs, Inc	516-536-4242
NC	Raleigh, Zucker Assocs	919-782-8433
OH	Cincinnati, R.O. Whitesell & Assoc	513-528-5644
OH	Cleveland, R.O. Whitesell & Assoc	216-447-9020
OH	Columbus, R.O. Whitesell & Assoc	614-888-9396
OH	Dayton, R.O. Whitesell & Assoc	513-298-9546
PA	Erdenheim, OMNI Sales	215-233-4600
PA	Pittsburg, R.O. Whitesell & Assoc	412-963-6161
TX	IXYS (Central Region)	214-644-4115
TX	Austin, Barry Sales, Inc	512-837-3616
TX	Houston, Barry Sales, Inc	713-784-5860
TX	Richardson, Barry Sales, Inc	214-234-0255
UT	Salt Lake City, Moss Mktg	801-363-5875
WA	Bellevue, Advanced Power Comps	206-747-9127
WA	Seattle, Advanced Power Comps	206-527-7945
WA	Spokane, Advanced Power Comps	509-928-7959
WA	Vancouver, Advanced Power Comps	206-896-4239
WI	Mequon, Martan	414-241-4955
Can	Ontario, Astec	416-669-4022
Can	Vancouver, Advanced Power Comps	604-436-0552

Distributors

AL	Huntsville, Future Electrns	205-830-2322
AL	Huntsville, Nu Horizons	205-722-9330
AZ	Phoenix, Future Electrns	602-968-7140
CA	Broomfield, Future Electrns	303-421-0123
CA	Chatsworth, Future Electrns	818-772-6240
CA	Irvine, Future Electrns	714-250-4141
CA	San Diego, Future Electrns	619-625-2800
CA	San Jose, All American	408-943-1200
CA	San Jose, Future Electrns	408-434-1122
CA	San Jose, Jaco	408-432-9290
CA	Torrance, All American	213-320-0240
CA	Westlake, Jaco	805-495-9998
CO	Aurora, QPS	303-343-9260
CO	Denver, All American	303-756-0817
CT	Nu Horizons	203-265-0162
CT	Bethel, Future Electrns	203-743-9594
CT	Meridian, Jaco	203-235-1422
FL	Altamonte Springs, Future Electrns	407-767-8414
FL	Boca Raton, Jaco	407-241-7943
FL	Ft. Lauderdale, Nu Horizons	305-735-2555
FL	Largo, Future Electrns	813-530-1222
FL	Miami, All American	305-621-8282
FL	Sunrise, All American	305-572-7999
GA	Norcross, Future Electrns	404-441-7676
GA	Norcross, Jaco	404-449-0508
GA	Norcross, Nu Horizons	404-416-8666
IL	Hoffman Estates, Future Electrns	708-882-1255
IL	La Fox, Richardson Electrn	708-208-2200
IL	Schaumburg, Marsh Electrns	708-240-9290
IL	Schaumburg, QPS	708-884-6620
MD	Columbia, Future Electrns	301-290-0600
MD	Columbia, Jaco	301-995-6620
MD	Columbia, Nu Horizons	301-995-6330
MD	Rockville, All American	301-251-1205
MA	Bolton, Future Electrns	508-779-3000
MA	Tewksbury, Jaco	508-640-0010
MA	Wakefield, All American	617-246-2300
MA	Wakefield, Nu Horizons	617-246-4441
MI	Livonia, Future Electrns	313-261-5270
MN	Eden Prairie, Future Electrns	612-944-2200
MN	Minneapolis, All American	612-944-2151
MO	St. Louis, Future Electrns	314-469-6805
NJ	Marlton, Future Electrns	609-569-1833
NJ	Marlton, Nu Horizons	609-596-1833
NJ	Parsippany, Future Electrns	201-299-0400
NJ	Pine Brook, Nu Horizons	201-882-8300
NY	Amityville, Nu Horizons	516-226-6000
NY	Canandaigua, Advacom	716-396-9050
NY	East Rochester, Nu Horizons	716-248-5980
NY	Hauppauge, Future Electrns	516-234-4000
NY	Hauppauge, Jaco	516-273-5500
NY	Liverpool, Future Electrns	315-451-2371
NY	Rochester, Future Electrns	716-272-1120
NY	Ronkonkoma, All American	516-981-3935
NC	Concord, Future Electrns	704-455-9030
NC	Raleigh, Future Electrns	919-790-7111
NC	Raleigh, Jaco	919-876-7767
OH	Cleveland, Darrah Elec	216-631-0912
OH	Cleveland, Future Electrns	216-449-6996
OH	Delware, Advacom	614-369-8843
OH	Stow, Advacom	216-688-5311
OK	Tulsa, Jaco	916-664-8812
OR	Beaverton, Future Electrns	503-645-9454
OR	Portland, All American	503-297-5295
OR	Portland, Dunn Electrns	503-285-0214
PA	Export, Advacom	412-325-7551
PA	McKean, Advacom	814-476-7774
PA	York, Advacom	717-741-9277
TX	Addison, Jaco	214-733-4300
TX	Austin, Jaco	512-835-0220
TX	Dallas, Thyristor Power	215-241-1398
TX	Houston, Future Electrns	713-556-8696
TX	Richardson, All American	214-231-5300
TX	Richardson, Future Electrns	214-437-2437
TX	Sugarland, Jaco	713-240-2255
UT	Salt Lake City, Future Electrns	801-972-8489
WA	Redmond, Future Electrns	206-881-8199
WA	Redmond, Jaco	206-881-9700
WI	Milwaukee, Marsh Electrns	414-475-6000
WI	Waukesha, Future Electrns	414-786-1884
Can	Alb., Calgary, Future Electrns	403-250-5551
Can	Alb., Edmonton, Future Electrns	403-438-2858
Can	B.C. Vancouver, Future Electrns	604-294-1166
Can	Manitoba, Winnipeg, Future Electrns	204-786-7711
Can	Ont., Mississauga, Future Electrns	416-612-9200
Can	Ont., Mississauga, R-Theta	416-890-0221
Can	Ont., Ottawa, Future Electrns	613-820-8313
Can	Que., Pierrefond, R-Theta	514-620-2325
Can	Que., Pointe Claire, Future Electrns	514-694-7710
Can	Que., Quebec City, Future Electrns	418-877-6666

The Krueger Company

FAX: 602-820-1707

KRUEGER COMPANY, 1544 W. Mineral Road, Tempe, Arizona 85283, Tel: 800-245-2235, 602-820-5330, FAX: 602-820-1707

LANSDALE SEMICONDUCTOR, INC.

FAX: 602-438-0138

LANSDALE SEMICONDUCTOR, INC., 2929 South 48th Street, Ste. 2, Tempe, Arizona 85282, Tel: 602-438-0123, FAX: 602-438-0138

Sales Office & Representatives

AL	Huntsville, CSR Elctrns	205-533-2444
AZ	Paradise Valley, CMA Sales	602-840-8383
CA	Costa Mesa, Solid State Sales	714-650-8414
CA	Pleasanton, Leddy Assoc, Inc.	510-417-1033
FL	Longwood, Beacon Electrns	407-332-1940
GA	Atlanta, CSR Electrns	404-396-3720
IL	Park Ridge, Synmark Sales, Inc.	708-390-9696
IN	Indianapolis, TPS & Assoc	317-841-3046
IA	Cedar Rapids, Spectrum Sales	319-366-0576
KS	Prairie Village, Spectrum Sales	913-648-6811
MA	Amesbury, Carl Sheys Assoc	508-388-3616
MN	Wayzata, Cardinal Sales Co.	612-475-0042
MO	Florissant, Spectrum Sales	314-921-1313
NY	Endwell, Reagan/Compar, Inc.	607-754-2171, 607-754-8946
NY	Hicksville, J-Square Mktg, Inc.	516-935-3200
NC	Indian Trail, CSR Electrns	704-882-3995
NC	Raleigh, CSR Electrns	919-878-9200
OH	Stow, Lee Tronics, Inc.	216-688-8832
OH	Tipp City, Cleary Sales Co.	513-667-7703
OR	Portland, Index, Inc.	503-289-9627
PA	Southampton, Campbell Assocs	215-322-6630
TN	Knoxville, CSR Electrns	615-637-0293
TX	Richardson, Interactive Comp Sales, Inc.	214-669-2277
VA	Reston, Boyle Assoc	703-620-9558
WA	Renton, Index, Inc.	206-271-2979
Can	Ont, Mississauga, Tech-Trek, Ltd	416-238-0366

Distributors

Intl	Japan, Fuji Elctrns	310-214-5100
Intl	United Kingdom, Oxfordshire, Versa dis Limited	0844-261686

LATTICE SEMICONDUCTOR CORP., 5555 N.E. Moore Ct., Hillsboro, Oregon 97124, Tel: 1-800-FASTGAL, FAX: 503-681-3037

Sales Office & Representatives

AL	Huntsville, CSR Elctrns Inc	205-533-2444
AZ	Scottsdale, Summit Sales	602-998-4850
CA	Fountain Valley, Bager Electrns	714-957-3367
CA	Irvine, Lattice Semiconductor Corp.	714-580-3880
CA	San Diego, Earle Assoc	619-278-5441
CA	Santa Clara, Criterion Sales	408-988-6300
CA	Santa Clara, Lattice Semiconductor Corp.	408-980-7878
CA	Woodland Hills, Bager Electrns	818-712-0011
CO	Wheat Ridge, Waugaman Assoc	303-423-1020
CT	Hamden, Comp Rep Assocs	203-230-8369
FL	Altamonte Springs, Sales Engnr Concepts	407-830-8444
FL	Deerfield Bch, Sales Engnr Concepts	305-426-4601
GA	Atlanta, CSR Elctrns Inc	404-396-3720
GA	Norcross, Lattice Semiconductor Corp.	404-446-2930
IL	Itasca, Lattice Semiconductor Corp	708-250-3118
IL	Rolling Meadows, Sumer	708-991-8500
IN	Indianapolis, Electrn Sales & Engnr	317-849-4260
IA	Cedar Rapids, Stan Clothier Co	319-393-1576
KS	Lenexa, Stan Clothier Co.	913-492-2124
MD	Gaithersburg, Deltatronics	301-253-0615
MA	Burlington, Lattice Semiconductor Corp.	617-229-5819
MA	Westwood, Comp Rep Assocs	617-329-3454
MI	Grosse Pointe Park, Greiner & Assoc	313-499-0188
MN	Eagan, Lattice Semiconductor Corp.	612-686-8747
MN	Eden Prairie, Stan Clothier Co	612-944-3456
MO	St. Charles, Stan Clothier Co.	314-928-8078
NJ	Lattice Semiconductor Corp.	201-744-5908
NJ	West Caldwell, Tech Mktg. Group	201-226-3300
NY	E. Rochester, Tri Tech Electrns	716-385-6500
NY	Fayetteville, Tri Tech Electrns	315-446-2881
NY	Fishkill, Tri Tech Electrns	914-897-5611
NY	Melville, Tech Mktg. Group	516-351-8833
NC	Indian Trail, CSR Elctrns Inc	704-882-3995
NC	Raleigh, CSR Elctrns Inc	919-878-9200
OH	Cinncinati, Makin & Assoc	513-871-2424
OH	Dublin, Makin & Assoc	614-793-9545
OH	Solon, Makin & Assoc	216-248-7370
OK	Tulsa, West Assoc	918-492-4300
OR	Beaverton, Comps West	503-642-9110
OR	Hillsboro, Lattice Semiconductor Corp.	503-691-2657
PA	Blue Bell, Deltatronics	215-641-9930
TN	Knoxville, CSR Elctrns Inc	615-637-0293
TX	Austin, West Assoc	512-343-1199
TX	Austin, Lattice Semiconductor Corp	512-343-4506
TX	Houston, West Assoc	713-999-0101
TX	Irving, Lattice Semiconductor Corp.	214-650-1236
TX	Richardson, West Assoc	214-680-2800
UT	Murray, Waugaman Assocs.	801-261-0802
VA	Alexandria, Deltatronics	703-971-1733
WA	Redmond, Comps West	206-885-5880
WI	Brookfield, Sumer	414-784-6641
Can	Alb., Calgary, Dynasty Comps	403-686-2362
Can	British Columbia, Vancouver, Dynasty Comps	604-880-0301
Can	Ontario, Ottawa, Dynasty Comps	613-596-9800
Can	Ontario, Toronto, Dynasty Comps	416-672-5977
Can	Que., Montreal, Dynasty Comps	514-843-1879
Intl	Australia, Austimer NSW, RAE Indl Elec Pty	61-42-673722
Intl	Australia, Sidney, Zatek Comps	61-2-874-0122
Intl	Austria, Wein, Steiner Electrn GmbH	43-1-877-7474-0
Intl	Belguim, Kontich, Alcom Electrns nv/sa	32-3-458-3033
Intl	Denmark, Brendby, Ditz Schweitzer	45-42-45-30-44
Intl	Finland, Helsinki, Integrated Electrns OY	358-0-351-3134
Intl	France, Sevres, Lattice Semiconductor	33-1-45-34-10-10
Intl	France,Antony Cedex, Almex	33-1-4096-5400
Intl	France,Antony Cedex, Franelec	33-1-4096-0909
Intl	Germany, Munchen, Lattice Semiconductor	49-8165-9516-0
Intl	Germany, Munchen, Avnet/E2000 GmbH	49-89-45-11-0-04
Intl	Germany, Quickborn, A.N. Enatechnik GmbH	49-4106-612-0
Intl	Hong Kong, Lattice Semiconductor	852-529-0356
Intl	Hong Kong, Kowloon, RTI Inds Co. Ltd.	852-795-7421
Intl	India, Bombay, Hindetron	91-812-348-266
Intl	Ireland, Kilkenny, Silicon Concepts	353-56-64002
Intl	Israel, Tel-Aviv, Telsys Ltd	03-492001-11
Intl	Italy, Milano, Comprel S.R.L	39-2-61206415
Intl	Italy, Milano, Comprel S.P.A.	39-3-62553991
Intl	Japan, Osaka, Hoei Denki	81-6-394-4596
Intl	Japan, Tokyo, Ado Electrn Indust. Co.	81-3-3257-2600
Intl	Japan, Tokyo, Hakuto Company, Ltd.	81-3-3597-8954
Intl	Japan, Tokyo, Chuo-ku, Lattice Semiconductor	81-3-5820-3533
Intl	Japan, Yokohama, Japan Macnics Corp.	81-45-939-6140
Intl	Korea, Seoul, Ellen & Company	82-2-579-3330
Intl	Korea, Seoul, Wooyoung Tech Co. Ltd	82-2-369-7099
Intl	Netherlands, Ijssel, Alcom Electrns B.V.	31-10-4519533
Intl	Norway, Oslo, Henaco A/S	47-22162110
Intl	S. Africa, Isando, Pace Electrns Comps	27-11-974-1525
Intl	Scotland, Silicon Concepts	44-661-843955
Intl	Singapore, Technology Distribution	65-299-7811
Intl	Spain, Madrid, ATD	34-1-661-6551
Intl	Sweden, Jarfalla, Pelcon Electrns	46-8-795-9870
Intl	Switzerland, Baden-Dattwil, Eurodis Primotec AG	41-5684-0171
Intl	Taiwan, Taipei, Master Electrns Corp.	886-02-735-0905
Intl	Taiwan, Taipei, Score Zap Inds	886-2-627-7045
Intl	U.K. Berkshire, Lattice Semiconductor	44-753-830-842
Intl	U.K. England, Oxon, Micro Call	44-84-426-1939
Intl	U.K., Wales, Gwent, Silicon Concepts Ltd	44-291-624101
Intl	U.K.,England, Hampshire, Silicon Concepts Ltd	44-428-751617
Intl	U.K.,England, Slough, Macro Mktg.	44-628-604383
PR	Ponce, Sales Engrg Concepts	809-841-4220

Distributors

AL	Huntsville, Arrow Electrns	205-837-6955
AL	Huntsville, Marshall Inds	205-881-9235
AL	Huntsville, Hamilton Hallmark	205-837-3700
AZ	Phoenix, Hamilton Hallmark	602-437-1200
AZ	Phoenix, Marshall Inds	602-496-0290
AZ	Tempe, Arrow Electrns	602-431-0030
AZ	Tempe, Insight Electrns	602-829-1800
CA	Calabasas, Arrow Electrns	818-880-9686
CA	Calabasas, Marshall Inds	818-878-7000
CA	Costa Mesa, Hamilton Hallmark	714-641-4100
CA	El Monte, Marshall Inds	818-307-6000
CA	Irvine, Arrow Elctrns	714-587-0404
CA	Irvine, Insight Electrns	714-727-3291
CA	Irvine, Marshall Inds	714-458-5301
CA	Milpitas, Marshall Inds	408-942-4600
CA	Rancho Cordova, Marshall Inds	916-635-9700
CA	Rocklin, Hamilton Hallmark	916-624-9781
CA	San Diego, Arrow Electrns	619-565-4800
CA	San Diego, Hamilton Hallmark	619-571-7540
CA	San Diego, Insight Electrns	619-587-1100
CA	San Diego, Marshall Inds	619-627-4140
CA	San Jose, Arrow Electrns	408-441-9700
CA	San Jose, Arrow Electrns	408-428-6400
CA	Sunnyvale, Insight Electrns	408-720-9222
CA	Sunnyvale, Hamilton Hallmark	408-743-3300
CA	Westlake Village, Insight Electrns	818-707-2101
CA	Woodland Hills, Hamilton Hallmark	818-594-0404
CO	Englewood, Arrow Electrns	303-799-0258
CO	Englewood, Hamilton Hallmark	303-790-1662
CO	Englewood, Insight Electrns	303-649-1800
CO	Thornton, Marshall Inds	303-451-8383
CT	Cheshire, Hamilton Hallmark	203-271-2844
CT	Wallingford, Arrow Electrns	203-265-7741
CT	Wallingford, Marshall Inds	203-265-3822
FL	Altamonte Springs, Marshall Inds	407-767-8585
FL	Deerfield Beach, Arrow Electrns	305-429-8200
FL	Ft. Lauderdale, Hamilton Hallmark	305-484-5482
FL	Ft. Lauderdale, Marshall Inds	305-977-4880
FL	Lake Mary, Arrow Electrns	407-333-9300
FL	Largo, Hamilton Hallmark	813-541-7440
FL	St. Petersburg, Marshall Inds	813-573-1399
FL	Winter Park, Hamilton Hallmark	407-657-3300
GA	Duluth, Arrow Electrns	404-497-1300
GA	Duluth, Hamilton Hallmark	404-623-4400
GA	Norcross, Marshall Inds	404-923-5750
IL	Bensonville, Hamilton Hallmark	708-860-7780
IL	Itasca, Arrow Electrns	708-250-0500
IL	Schaumburg, Marshall Inds	708-490-0155
IN	Indianapolis, Arrow Electrns	317-299-2071
IN	Indianapolis, Hamilton Hallmark	317-872-8875
IN	Indianapolis, Marshall Inds	317-297-0483
IA	Cedar Rapids, Arrow Electrns	319-395-7230
KS	Lenexa, Arrow Electrns	913-541-9542
KS	Lenexa, Marshall Inds	913-492-3121
KS	Lenexa, Hamilton Hallmark	913-888-4747
MD	Columbia, Arrow Electrns	301-596-7800

MD	Columbia, Hamilton Hallmark	410-988-9800
MD	Silver Springs, Marshall Inds	301-622-1118
MA	Peabody, Hamilton Hallmark	508-532-9808
MA	Wilmington, Arrow Electrns	508-658-0900
MA	Wilmington, Marshall Inds	508-658-0810
MI	Livonia, Arrow Electrns	313-462-2290
MI	Livonia, Marshall Inds	313-525-5850
MI	Novi, Hamilton Hallmark	313-347-4271
MN	Bloomington, Hamilton Hallmark	612-881-2600
MN	Eden Prairie, Arrow Electrns	612-941-5280
MN	Plymouth, Marshall Inds	612-559-2211
MO	Bridgeton, Marshall Inds	314-291-4650
MO	Earth City, Hamilton Hallmark	314-291-5350
MO	St. Louis, Arrow Electrns	314-567-6888
NJ	Cherry Hill, Hamilton Hallmark	609-424-0110
NJ	Fairfield, Marshall Inds	201-882-0320
NJ	Marlton, Arrow Electrns	609-596-8000
NJ	Mt Laurel, Marshall Inds	609-234-9100
NJ	Parsippany, Hamilton Hallmark	201-515-5300
NJ	Pinebrook, Arrow Electrns	201-227-7880
NY	Endicott, Marshall Inds	607-785-2345
NY	Hauppauge, Arrow Electrns	516-231-1000
NY	Hauppauge, Marshall Inds	516-273-2424
NY	Hauppauge, Hamilton Hallmark	516-434-7470
NY	Melville, Arrow Electrns	516-391-1300
NY	Rochester, Arrow Electrns	716-427-0300
NY	Rochester, Marshall Inds	716-235-7620
NY	Rochester, Hamilton Hallmark	716-475-9130
NY	Ronkonkoma, Hamilton Hallmark	516-737-0600
NC	Raleigh, Arrow Electrns	919-876-3132
NC	Raleigh, Marshall Inds	919-878-9882
NC	Raleigh, Hamilton Hallmark	919-872-0712
OH	Centerville, Arrow Electrns	513-435-5563
OH	Dayton, Marshall Inds	513-898-4480
OH	Dayton, Hamilton Hallmark	513-439-6735
OH	Solon, Arrow Electrns	216-248-3990
OH	Solon, Marshall Inds	216-248-1788
OH	Solon, Hamilton Hallmark	216-498-1100
OH	Worthington, Hamilton Hallmark	614-888-3313
OK	Tulsa, Arrow Electrns	918-252-7537
OK	Tulsa, Hamilton Hallmark	918-254-6110
OR	Beaverton, Almac-Arrow Electrns	503-629-8090
OR	Beaverton, Insight Electrns	503-526-6200
OR	Beaverton, Marshall Inds	503-644-5050
PA	Pittsburgh, Marshall Inds	412-788-0441
TX	Austin, Arrow Electrns	512-835-4180
TX	Austin, Insight Electrns	512-331-5887
TX	Austin, Hamilton Hallmark	512-258-8848
TX	Austin, Marshall Inds	512-837-1991
TX	Carrollton, Arrow Electrns	214-380-6464
TX	Dallas, Hamilton Hallmark	214-553-4300
TX	Houston, Arrow Electrns	713-530-4700
TX	Houston, Marshall Inds	713-895-9200
TX	Houston, Hamilton Hallmark	713-781-6100
TX	Richardson, Insight Electrns	214-783-0800
TX	Richardson, Marshall Inds	214-705-0600
TX	Sugarland, Insight Electrns	713-448-0800
UT	Salt Lake City, Arrow Electrns	801-973-6913
UT	Salt Lake City, Hamilton Hallmark	801-266-2022
UT	Salt Lake City, Marshall Inds	801-973-2288
WA	Bellevue, Almac-Arrow Electrns	206-643-9992
WA	Bothell, Marshall Inds	206-486-5747
WA	Kirkland, Insight Electrns	206-820-8100
WA	Redmond, Hamilton Hallmark	206-881-6697
WI	Brookfield, Arrow Electrns	414-792-0150
WI	New Berlin, Hamilton Hallmark	414-797-7844
WI	Waukesha, Marshall Inds	414-797-8400
Can	Alberta, Calgary, Future Electrns	403-250-5550
Can	Alberta, Edmonton, Future Electrns	403-438-2858
Can	B.C., Burnaby, Hamilton Hallmark	604-420-4101
Can	British Columbia, Burnaby, Arrow Electrns	604-421-2333
Can	British Columbia, Vancouver, Future Electrns	604-294-1166
Can	Manitoba, Winnipeg, Future Electrns	204-786-7711
Can	Ont., Mississauga, Hamilton Hallmark	416-564-6060
Can	Ont., Nepean, Hamilton Hallmark	613-226-1700
Can	Ontario, Brampton, Marshall Inds	416-458-8046
Can	Ontario, Mississauga, Arrow Electrns	416-670-7769
Can	Ontario, Mississauga, Future Electrns	416-612-9200
Can	Ontario, Nepean, Arrow Electrns	613-226-6903
Can	Ontario, Ottawa, Future Electrns	613-820-8313
Can	Que., Ville St. Laurent, Hamilton Hallmark	514-335-1000
Can	Quebec, Dorval, Arrow Electrns	514-421-7411
Can	Quebec, Pointe Claire, Future Electrns	514-694-7710
Can	Quebec, Pointe Claire, Marshall Inds	514-694-8142
Can	Quebec, Quebec City, Future Electrns	418-877-6666
Intl	Australia, Parramatta, ZATEK Comps, Ltd	61-2-895-5534
Intl	Australia, Sidney, ZATEK Comps, Ltd	61-2-874-0122
Intl	Australia, Thirroul, RAE Indl Elec Pty	61-42-673722
Intl	Austria, Wein, Ing. E. Steiner GmbH	43-222-827-4740
Intl	Belguim, Kontich, Alcom Electrns B.V.B.A.	32-3-458-3033
Intl	Denmark, Brendby, Ditz Schweitzer	45-42-45-30-44
Intl	Finland, Espoo, Telercas OY	358-0-804-521622
Intl	France, Antony Cedex, Franelec	33-1-4096-0909
Intl	France, Massey Cedex, DataDis	33-69-20-4141
Intl	Germany, Haar bei Munchen, EBV/MHV	49-89-420-1107
Intl	Germany, Munich, Alfatron GmbH	49-89-4204-910
Intl	Hong Kong, Kowloon, RTI Inds Co. Ltd.	852-795-7421
Intl	India, Bombay, Hindetron	91-812-348-266
Intl	Ireland, Kilkenny, Silicon Concepts	353-566-4002
Intl	Israel, Herzlia, Unitec	972-52-576006
Intl	Italy, Milano, Comprel SRL	39-2-61206415
Intl	Italy, Milano, Comprel S.P.A.	39-2-6120641
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Intl	Japan, Tokyo, Ado Electrn Indust. Co.	81-3-3257-2600
Intl	Japan, Tokyo, Hakuto Co., Ltd.	81-3-3597-8910
Intl	Japan, Yokohama, Japan Macnics Corp.	81-45-939-6140
Intl	Korea, Seoul, Ellen & Company	82-02-587-5724
Intl	Netherlands, Ijssel, Alcom Electrns B.V.	31-10-4519533
Intl	Norway, Oslo, Henaco A/S	47-2162110
Intl	S. Africa, Isando, Multikomponent	27-11-974-1525
Intl	Singapore, Technology Distribution	65-368-6065
Intl	Spain, Madrid, ATD	34-1-661-6551
Intl	Sweden, Spanga, Pelcon Electrns	46-8-795-9870
Intl	Switzerland, Baden-Dattwil, Ascom Primotec AG	41-5684-0171
Intl	Taiwan, Taipei, Master Electrns Corp.	886-02-735-7316
Intl	U.K., England, Slough, Macro Mktg.	44-628-604383
Intl	U.K., Wales, Gwent, Silicon Concepts Ltd	44-291-624101
Intl	U.K.,England, Hampshire, Silicon Concepts	44-428-751617
Intl	U.K.,England, Oxon, Micro Call	44-84-426-1939

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Sales Office & Representatives

AL	Huntsville, M Squared, Inc	205-830-0498
AZ	Phoenix, Reptronix, Ltd.	602-230-2630
CA	Campbell, Level One (Western Area)	408-879-2627
CA	San Diego, S C Cubed, Inc.	619-458-5808
CA	Sunnyvale, Trinity Technologies, Inc.	408-733-9000
CA	Tustin, RTS Assocs.	714-730-9561
CO	Englewood, Thorson Rocky Mountain Inc	303-773-6300
CO	Wheat Ridge, AVED Inc	303-422-1701
CT	Fairfield, NRG Limited	203-384-1112
FL	Maitland, EIR, Inc.	407-660-9600
FL	Miami, Level One (Eastern Area)	305-271-3577
GA	Norcross, M Squared, Inc	404-447-6124
IL	Bensenville, Horizon Tech Sls	708-860-7900
IL	Itasca, Beta Tech. Sales, Inc.	708-250-9586
IL	Lisle, Comps, Inc	708-852-7707
IN	Carmel, STB & Assocs.	317-844-9227
KS	Overland, QDC	913-341-2214
MD	Columbia, Third Wave Solutions, Inc.	410-290-5990
MA	Burlington, New Tech Solutions, Inc	617-229-8888
MN	Fridley, Voyager Elctrns Corp	612-571-7766
MN	Minneapolis, Russell & Assocs.	612-854-1166
NJ	Mt. Laurel, S-J Mid-Atlantic, Inc	609-866-1234
NM	Albuquerque, Reptronix, Inc.	505-292-1718
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NY	Rockville Centre, S-J Assocs., Inc.	516-536-4242
NC	Raleigh, M Squared, Inc	919-851-0010
OH	Columbus, S-J Assocs., Inc	614-885-6700
OH	Parma, S-J Assocs., Inc.	216-888-7004
OR	Portland, Matrex Mktg. & Sales	503-245-8080
TX	Austin, Mil-Rep Assocs., Inc.	512-346-6331
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TX	Houston, Mil-Rep Assocs., Inc.	713-444-2557
TX	Richardson, Mil-Rep Assocs., Inc.	214-644-6731
UT	Salt Lake City, Thorson Rocky Mountain Inc	801-942-1683
WA	Bellevue, Matrex Mktg. & Sales	206-643-0363
WI	Milwaukee, Beta Technology Sales, Inc.	414-543-6609
Can	British Columbia, Vancouver, Electro Source, Inc.	604-275-2734
Can	Ontario, Kanata, Electro Source, Inc.	613-592-3214
Can	Ontario, Rexdale, Electro Source, Inc.	416-675-4490
Can	Quebec, Pointe Claire, Electro Source, Inc.	514-630-7486
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Intl	Austria, Unterpremstatten, Austria Mikro Systeme Intl AG	43-03136-500
Intl	Belgium, Halle, Tekelec Belgium N.V.	32-2-360-1288
Intl	Denmark, Copenhagen, E.V. Johanssen Elektronik A/S	45-31-83-90-22
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Intl	England, Hampshire, Silicon Concepts Ltd	44-428-751617
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Intl	France, Chatillion Cedex, AVNET Composants	33-1-49-65-25-00
Intl	France, Massy, Reptronics, sa	33-1-60-13-9300
Intl	Germany, Hannover, Topas Electrn	49-511-131217
Intl	Germany, Kirchheim/Teck, Scantec	49-7021-54027
Intl	Germany, Planegg, Scantec	49-89-8598021
Intl	Germany, Quickborn, Topas Electrn	49-4106-73097
Intl	Germany, Ruckersdorf, Scantec	49-911-579529
Intl	India, Bangalore, Mancomp	91-812-647770
Intl	Israel, Azur, Seg Tec	972-3-556-7458
Intl	Italy, Milano, ECC Elettronica S.P.A.	39-2-48401547
Intl	Japan, Yokohama, Macnica	81-45-939-6140
Intl	Korea, Seoul, Sunin Trading Co	82-2-705-0852
Intl	Netherlands, Zoetermeer, Tekelec Airtronic	31-79-310100
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Intl	Portugal, Lisboa, Compa, LDA	351-1-3621283
Intl	Singapore, Serial System PTE Ltd	65-2800-200
Intl	Spain, Madrid, Amitron	34-542-09-06
Intl	Sweden, Taby, Bexab Sweden AB	46-8-630-88-00
Intl	Switzerland, Baden-Dattwil, Ascom Primotec AG	41-56-84-01-71
Intl	Taiwan, Taipei, ROC, Jeritronics, Ltd	886-2-58513636
Intl	Turkey, (Forest City, CA), Interex	415-574-0767
Intl	Turkey, Istanbul, Inter Muhendislik Danismanlik vd	90-1-349-9400

Distributors

AZ	Scottsdale, AVED Inc.	602-951-9788
CA	San Diego, AVED Inc.	619-558-8890
CA	San Jose, Bell Microproducts	408-451-9400
CA	Tustin, AVED Inc.	714-259-8258
CA	Visalia, AVED Inc.	209-734-8861
CA	Westlake Village, Bell Microproducts	805-496-2606
CT	Danbury, Phase 1 Tech. Corp.	203-791-9042

MD	Burtonsville, U.S. Electrns, Inc.	301-384-3300
MA	Wilimington, Bell Microproducts, Inc.	508-658-0222
NJ	Elmwood Park, Phase 1 Tech. Corp.	201-791-2990
NJ	West Berlin, GCI Corp.	609-768-6767
NY	Deer Park, Phase 1 Tech. Corp	516-254-2600
TX	Austin, AVED Inc.	512-454-8845
TX	Carrollton, LCD Electrns, Inc.	214-245-0600
TX	Dallas, AVED Inc.	214-404-1144
TX	Round Rock, LCD Electrns, Inc.	512-388-0900
UT	West Valley City, AVED Inc.	801-975-9500
Can	Ontario, Rexdale, Valtrie Mktg., Inc.	416-798-2555
Intl	Australia, North Ryde, NSW, Composite Elctrn Comps	61-2-878-5099
Intl	Austria, Unterpremstatten, Austria Micro Systeme Intl AG	43-03136-500
Intl	Belgium, Halle, Tekelec Belgium N.V.	32-2-360-1288
Intl	Denmark, Copenhagen, E.V. Johanssen Elektronik A/S	45-31-83-90-22
Intl	England, Gwent, Silicon Concepts Ltd	44-291-62-4101
Intl	England, Hampshire, Silicon Concepts Ltd	44-428-751617
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Intl	France, Massy, Reptronics, sa	33-1-60-13-9300
Intl	Germany, Hannover, Topas Electrn	49-511-131217
Intl	Germany, Kirchheim/Teck, Scantec	49-7021-54027
Intl	Germany, Planegg, Scantec	49-89-8598021
Intl	Germany, Quickborn, Topas Electrn	49-4106-73097
Intl	Germany, Ruckersdorf, Scantec	49-911-579529
Intl	India, Bangalore, Mancomp	91-812-647770
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Intl	Norway, Lillestrom, Bexab Norge A/S	47-68-33800
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Intl	Singapore, Serial System PTE Ltd	65-2800-200
Intl	Spain, Madrid, Amitron	34-542-09-06
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Intl	Switzerland, Baden-Dattwil, Ascom Primotec AG	41-56-84-01-71
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Intl	Turkey, Istanbul, Inter Muhendislik Danismanlik vd	90-1-349-9400

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Sales Office & Representatives

AL	Elcom	205-830-4001
AK	Linear Technlg Corp	408-432-1900
AZ	Tusar	602-998-3688
CA	Bager Elctrns	714-957-3367
CA	Bager Elctrns	818-712-0011
CA	Harvey King	619-695-9300
CA	Milpitas, Linear Technlg Corp	408-428-2050
CA	Woodland Hills, Linear Technlg Corp	818-703-0835
CO	Waugaman Assoc	303-423-1020
CT	Delta Conn Tech Sls	203-634-8558
FL	QXI, Inc	813-894-4556
FL	QXI, Inc	305-978-0120
FL	QXI, Inc	407-872-2321
GA	Elcom	404-447-8200
IL	Micro Sls	708-285-1000
IL	Addison, Linear Technlgy Corp	708-620-6910
IN	Gen II Mktg Inc	317-848-3083
IN	Gen II Mktg Inc	219-436-4485
IA	Gassner & Clark Co	319-393-5763
KS	Lorenz Sls	913-469-1312
KS	Lorenz Sls	316-721-0500
KY	Gen II Mktg, Inc	502-894-9903
MD	DGR, Inc	410-583-1360
MD	DGR, Inc	301-271-4209
MD	DGR, Inc	410-377-4788
MA	Linear Technlg Corp	508-658-3881
MI	Action Comp Sls	313-442-9880
MN	Vector Comp Sls, Inc	612-631-1334
MO	Lorenz Sls	314-997-4558
NE	Lorenz Sls	402-475-4660
NM	Nelco Electronix	505-293-1399
NY	S-J Assocs	516-536-4242
NY	Tri Tech Elctrns	315-446-2881
NY	Tri Tech Elctrns	716-385-6500
NY	Tri Tech Elctrns	914-897-5611
NC	Quantum Mktg Inc	919-846-5728
OH	Omega Sls Inc	216-360-9400
OH	Omega Sls Inc	513-434-5507
OR	Micro Sls	503-645-2841
PA	Omega Elctrn Sls Inc	215-244-4000
PA	Langhorne, Linear Technlg Corp	215-757-8578
SC	Quantum Mktg Inc	704-523-8822
TX	Austin, Mil-Rep Assoc	512-346-6331
TX	Dallas, Linear Technlg Corp	214-733-3071
TX	Dallas, Mil-Rep Assoc	214-644-6731
TX	Houston, Mil-Rep Assoc	713-444-2557
UT	Waugaman Assoc	801-261-0802
VA	DGR, Inc	703-742-0060
WA	Micro Sls	206-451-0568
WI	Micro Sls	414-786-1403
Can	British Columbia, Electro Source	604-275-2734
Can	British Columbia, Davetek	604-430-3680
Can	Ontario, Electro Source	416-675-4490
Can	Ontario, Electro Source	613-592-3214
Can	Quebec, Electro Source	514-630-7486
Intl	France, Chatenay Malabry, Linear Technlg S.A.R.L	33-1-46316161
Intl	Germany, Eching, Linear Technlg GmbH	49-89-3197410
Intl	Japan, Tokyo, Linear Technlg KK	81-3-3237-7891
Intl	Korea, Seoul, Linear Technlg Korea Branch	82-2-792-1617
Intl	Singapore, Linear Technlg Pte Ltd	65-293-5322
Intl	Taiwan, Taipei ROC, Linear Technlg Corp	886-2-521-7575
Intl	United Kingdom, Surrey, Linear Technlg (UK) Ltd	44-276-677676

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AL	Arrow/Schweber	205-837-6955
AL	Hammond Elctrns	205-830-4764
AL	Marshall Inds	205-881-9235
AZ	Arrow/Schweber	602-431-0030
AZ	Insight Elctrns	602-829-1800
AZ	Marshall Inds	602-496-0290
CA	Arrow/Schweber	818-880-9686
CA	Arrow/Schweber	714-587-0404
CA	Arrow/Schweber	619-565-4800
CA	Arrow/Schweber	408-441-9700
CA	Insight Elctrns	619-587-1100
CA	Insight Elctrns	714-727-2111
CA	Insight Elctrns	800-677-7716
CA	Jan Devices	818-708-1100
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CA	Marshall Inds	619-578-9600
CA	Marshall Inds	714-458-5301
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CA	Zeus Comps	714-921-9000
CA	Zeus Comps	408-629-4789
CA	Zeus Comps	818-889-3838
CO	Arrow/Schweber	303-799-0258
CO	Marshall Inds	303-451-8383
CT	Arrow/Schweber	203-265-7741
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FL	Arrow/Schweber	407-333-9300
FL	Arrow/Schweber	305-429-8200
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FL	Hammond Elctrns	305-973-7103
FL	Marshall Inds	407-767-8585
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FL	Chip Supply	407-298-7100
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GA	Marshall Inds	404-923-5750
IL	Arrow/Schweber	708-250-0500
IL	Marshall Inds	708-490-0155
IN	Arrow/Schweber	317-299-2071
IN	Marshall Inds	317-297-0483
IA	Arrow/Schweber	319-395-7230
KS	Arrow/Schweber	913-541-9542
KS	Marshall Inds	913-492-3121
MD	Arrow/Schweber	410-596-7800
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MD	Zeus Comps	410-997-1118
MA	Arrow/Schweber	508-658-0900
MA	Gerber Elctrns	617-769-6000
MA	Jan Devices	617-662-3901
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MA	Zeus Comps	617-246-8200
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MI	Arrow/Schweber	313-462-2290
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MO	Marshall Inds	314-291-4650
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NJ	Marshall Inds	201-882-0320
NJ	Marshall Inds	609-234-9100
NJ	Phase I Technlg	201-403-0002
NJ	Vantage Comps	201-777-4100
NY	Arrow/Schweber	716-427-0300
NY	Arrow/Schweber	516-231-1000
NY	Marshall Inds	607-785-2345
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NY	Phase 1 Technlg	516-254-2600
NY	Vantage Comps	516-543-2000
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NY	Zeus Comps	914-937-7400
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NC	Hammond Elctrns	919-275-6391
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OH	Arrow/Schweber	216-248-3990
OH	Arrow/Schweber	513-435-5563
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OH	Marshall Inds	513-898-4480
OH	Marshall Inds	800-627-1034
OH	Zeus Comps	513-293-6162
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OK	Marshall Inds	918-622-7151
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OR	Insight	503-644-3300
OR	Marshall Inds	503-644-5050
PA	Arrow/Schweber	609-596-8000
PA	Marshall Inds	412-788-0441
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TX	Arrow/Schweber	512-835-4180
TX	Arrow/Schweber	713-530-4700
TX	Insight	214-783-0800
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TX	Marshall Inds	713-467-1666
TX	Marshall Inds	915-593-0706
TX	Zeus Comps	214-783-7010
TX	Minco Tehcnlg Labs Inc	512-834-2022
UT	Arrow/Schweber	801-973-6913
UT	Marshall Inds	801-973-2288
UT	Almac/Arrow	206-643-9992
UT	Insight Elctrns	206-820-8100
UT	Marshall Inds	206-486-5747
WI	Arrow/Schweber	414-792-0150
WI	Marshall Inds	414-797-8400
Can	British Columbia, Arrow/Schweber	604-421-2333
Can	British Columbia, Electro Sonic	403-255-9550
Can	British Columbia, Electro Sonic	604-273-2911
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Can	British Columbia, ITT/RAE	604-291-8866
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Can	Manitoba, ITT/RAE	204-786-8401
Can	Ontario, Arrow/Schweber	416-670-7769
Can	Ontario, Arrow/Schweber	613-226-6903

Can	Ontario, Electro Sonic	416-494-1666
Can	Ontario, Electro Sonic	613-728-8333
Can	Ontario, ITT/RAE	416-798-4884
Can	Ontario, ITT/RAE	613-226-7406
Can	Ontario, Marshall Inds	416-458-8046
Can	Quebec, Arrow/Schweber	514-421-7411
Can	Quebec, ITT/RAE	514-335-7697
Can	Quebec, Marshall Inds	514-694-8142
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Intl	Austria, Bacher Elektronische GmbH	01-816020
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Intl	Denmark, E.V. Johanssen Elektronik	031-839022
Intl	Finland, OY Fintronic AB	0-6926022
Intl	France, Arrow Electronique	01-49784978
Intl	France, Tekelec Airtronic	1-46232425
Intl	Germany, Enatechnik GmbH	04106-6120
Intl	Germany, Metronik GmbH	089-611080
Intl	Germany, Setron	0531-80980
Intl	Hong Kong, Leadertronics Co	3-890384
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Intl	Italy, Silverstar	02-66125
Intl	Japan, Macnica, Inc	045-939-6140
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Intl	Korea, J-Tek Corp	02-786-9013
Intl	Korea, Sangsoo Elctrns	02-780-5360
Intl	Netherlands, Alcom Elctrns BV	010-4519533
Intl	Norway, Eltron A/S	02-500650
Intl	Portugal, Comps Electrnos	01-632563
Intl	Singapore, Westech Elctrns	743-6355
Intl	South Africa, Multitech Elctrns Corp	21-644103
Intl	Spain, Amitron	01-2485863
Intl	Sweden, Svensk Teleindustri	08-7617300
Intl	Switzerland, Ascom Primotec	056-840171
Intl	Taiwan, Falcon Elctrns Co	02-7081593
Intl	Taiwan, Morrihan Intl Corp	02-752-2200
Intl	Taiwan, Promate Elctrnc Co	02-7763512
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CA	Santa Clara, Electec Sls. Inc.	408-496-0706
CA	Solana Beach, Cerco	619-792-5555
CO	Englewood, Thorsen Rocky Mountain, Inc.	303-799-3435
CT	Southbury, Dynamic Technlgs.	203-262-6220
FL	Altamonte Springs, SEC	407-682-4800
FL	Deerfield Beach, SEC	305-426-4601
GA	Lawrence, STG	404-979-2055
IL	Arlington Hgts., KMA Sls. Co.	708-398-5300
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IN	Indianapolis, R.O. Whitesell & Assoc.	317-359-9283
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IA	Cedar Rapids, Rep Assocs. Corp.	319-373-0152
KS	Olathe, Stan Clothier Co.	913-829-0073
KY	Versailles, R.O. Whitesell & Assoc.	606-873-1182
MD	Baltimore, Burgin Kreh	301-265-8500
MI	Grand Blanc, R.O. Whitesell & Assoc.	313-695-0770
MI	Grand Rapids, R.O. Whitesell & Assoc.	616-942-5420
MI	Southfield, R.O. Whitesell & Assoc.	313-352-5454
MI	St. Joseph, R.O. Whitesell & Assoc.	616-983-7337
MN	Minneapolis, Comps. Grp.	612-374-1250
MS	Meridan, STG	601-485-7055
MO	St. Charles, Stan Clothier Co.	314-928-8078
NH	Salem, Integrated Technlg. Inc.	603-898-6333
NJ	West Caldwell, Tech Mktg. Grp.	201-226-3300
NM	Albuquerque, Quatra Assoc.	505-296-6781
NY	East Syracuse, Nycom Inc.	315-437-8343
NY	Melville, Tech. Mktg. Grp.	516-351-8833
NC	Raleigh, Prime Comps.	919-850-9866
ND	Minneapolis, Comps. Grp.	612-374-1250
OH	Cincinnati, Luebbe Sls. Co.	513-530-0060
OH	Dayton, Luebbe Sls. Co.	513-294-0426
OH	Westlake, Luebbe Sls. Co.	216-800-0071
OR	Beaverton, Electra Tech. Sls., Inc.	503-643-5074
PA	Norristown, D.E.R. Inc.	215-272-4502
PA	Pittsburgh, Luebbe Sls. Co.	412-364-0490
SC	Charlotte, Prime Comps.	704-522-1150
TX	Carrollton, TMI	214-387-3601
TX	Houston, TMI	713-783-4497
UT	Salt Lake City, Thorston Rocky Mountain, Inc.	801-973-7969
VA	Lynchburg, Burgin Kreh	804-239-2626
WA	Kirkland, Electra Tech. Sls., Inc.	206-821-7442
WI	Milwaukee, KMA Sls. Co.	414-259-1771
WI	Minneapolis, Comps. Grp.	612-374-1250
Can	Ontario, Mississauaga, Vitel Elctrns.	416-676-9720
Can	Ontario,Kanata, Vitel Elctrns.	613-592-0090
Can	Quebec, Lachine, Vitel Elctrns.	514-636-5951
Intl	Australia, Prospect, A.J. Distributor Pty. Ltd.	(08)2691244
Intl	Austria, Wien, Moor Lackner GesmbH	011-43-610620
Intl	Finland, Helsinki, Flinkenberg Oy	358-0647311
Intl	France, Cedex, A2M	395-49113
Intl	Germany, Deisenhofen, Astronic GMBH	89-6130303
Intl	Germany, Friedberg, Eurocomp Elektronik GmbH	6031-61076
Intl	Germany, Goeppingen, Milgray	7161-67200
Intl	Germany, Munich, Alfatron GmbH	(89)4204910
Intl	Germany, Taufkirchen, Asternetics GMBH	(89)612900
Intl	Hong Kong, Kowloon, Tektron Elctrns., Ltd.	852-880629
Intl	Israel, Petah Tikva, Boran Technlgs. Ltd.	972-3-9345171
Intl	Italy, Milano, Kontron Elektronik	02-5072-2310
Intl	Japan, Tokyo, Hakuto Co., Ltd.	81-3-35022211
Intl	Korea, Seoul, Shinhwa Corp.	(02) 554-6431/5
Intl	Netherlands, Hertogenbosch, Techmation Manudax Elctrns. B.V.- T,M.E.B.V.	(31)-73-221010
Intl	Norway, Oslo, Henaco A/S	02-162110
Intl	Portugal, Lisbon, Compa Compes Electrnos LTDA	010-351-1-3621284
Intl	Singapore, Taiga Elctrns. PTE Ltd.	2861980
Intl	South Africa, Pretoria, Elctrn. Bldg. Elements	(27)12-8037680/93
Intl	Spain, Barcelona, Amitron S.A.	34-3-4907494
Intl	Sweden, Soina, Naxab	08-985140
Intl	Switzerland, Urdorf, Kontron Elektronik	441-736-4111
Intl	Taiwan, Taipei, Helm Engnr & Trading	(02)706-1888
Intl	Taiwan, Taipei, Irtronic Corp.	(02)531-5467
Intl	United Kingdom, Bucks, Ambar Cascom Ltd.	0296-434141
PR	Cayey, SEC	809-250-0140

Distributors

AZ	Tempe, Bell Inds., Inc.	602-966-7800
CA	Agoura Hills, Zeus	818-889-3838
CA	Chatsworth, Future Elctrns.	818-772-6240
CA	Cypress, Bell Inds.	714-895-7801
CA	Irvine, Future Elctrns.	714-250-4141
CA	Laguna Hills, Jaco / Quality Comp	714-837-8966
CA	Los Angeles, Bell Inds.	213-826-6778
CA	Rocklin, Bell Inds., Inc.	916-652-0414
CA	San Diego, Bell Inds.	619-268-1277
CA	San Diego, Future Elctrns.	619-278-5020
CA	San Jose, All American	408-943-1200
CA	San Jose, Future Elctrns. Corp.	408-434-1122
CA	San Jose, Jaco / Quality Comp	408-432-9290
CA	San Jose, Zeus	408-629-4789
CA	Sunnyvale, Bell Inds., Inc.	408-734-8570
CA	Torrance, All American	213-320-0240
CA	Walnut, ACI Elctrns. Corp.	714-594-1731
CA	Westlake Village, Jaco	805-495-9998
CA	Yorba Linda, Zeus Comps. West	714-921-9000
CO	Broomfield, Future Elctrns. Corp.	303-421-0123
CO	Wheatridge, Bell Inds.	303-424-1985
CT	Bethel, Future Elctrns. Corp.	203-743-9594
CT	Killingworth, ACI Elctrns. Corp.	203-663-3311
CT	Meriden, Jaco	203-235-1422
FL	Altamonte Springs, Bell Inds.	407-339-0078
FL	Altamonte Springs, Future Elctrns. Corp.	407-767-8414
FL	Clearwater, Future Electrns Corp	813-578-2770
FL	Miami, All American	305-621-8282
FL	Oviedo, Zeus Comps.	407-365-3000
FL	Sunrise, All American	305-572-7999
FL	Tampa, Jaco / Quality Comp.	813-628-4665
GA	Norcross, Bell Inds.	404-662-0923
GA	Norcross, Future Elctrns. Corp.	404-441-7676
IL	Elk Grove Village, Bell Inds.	708-640-1910
IL	Schaumburg, Future Elctrns. Corp.	312-882-1255
IN	Fort Wayne, Bell Inds.	219-423-3422
IN	Indianapolis, Bell Inds.	317-875-8200
MD	Columbia, Future Elctrns. Corp.	301-290-0600
MD	Columbia, Jaco	301-995-6620
MD	Columbia, Zeus	301-997-1118
MD	Rockville, All American	301-251-1205
MA	Andover, Bell Inds.	508-474-8880
MA	Lexington, Zeus	617-863-8800
MA	Tewksbury, Jaco	508-640-0010
MA	Wakefield, All American	617-246-2300
MA	Westborough, Future Electrns Corp	508-366-2400
MA	Wilmington, Jaco / Quality Comp.	617-273-1860
MA	Woburn, ACI Elctrns. Corp.	617-935-7230
MI	Ann Arbor, Bell Inds.	313-971-9093
MI	Livonia, Future Elctrns. Corp.	313-261-5270
MN	Eden Prairie, All American	612-944-2151
MN	Eden Prairie, Future Elctrns. Corp.	612-944-2200
NH	Hudson, Bell Inds.	603-882-1133
NJ	Clifton, Vantage	201-777-4100
NJ	Fairfield, Future Elctrns. Corp.	201-227-4346
NJ	Marlton, Future Elctrns. Corp.	609-596-4080
NJ	Totowa, ACI Elctrns. Corp.	201-812-0507
NM	Albuquerque, Alliance	505-292-3360
NM	Albuquerque, Bell Inds.	505-292-2700
NY	Buffalo, Summit Elctrns.	716-887-2800
NY	Hauppauge, Future Elctrns. Corp.	516-234-4000
NY	Hauppauge, Jaco / Quality Comp.	516-273-5500
NY	Liverpoo;, Future Elctrns. Corp.	315-451-2371
NY	Plainview, ACI Elctrns. Corp.	516-293-6630
NY	Port Chester, Zeus Comps., Inc.	914-937-7400
NY	Rochester, Future Electrns Corp.	716-272-1120
NY	Rochester, Summit Elctrns.	716-334-8110
NY	Ronkonkoma, All American	516-981-3935
NY	Ronkonkoma, Zeus	516-737-4500
NY	Smithtown, Vantage	516-543-2000
NC	Charlotte, Future Elctrns. Corp.	704-529-5500
OH	Dayton, Bell Inds.	513-435-8660
OH	Dayton, Bell Inds.	513-434-8231
OH	Dayton, Zeus	513-293-6162
OK	Tulsa, Jaco /Quality Comp.	918-664-8812
OR	Beaverton, Future Elctrns. Corp.	503-645-9454
OR	Lake Oswego, Bell Inds.	503-635-6500
TX	Addison, Jaco / Quality Comp.	214-733-4300
TX	Austin, Jaco / Quality Comp.	512-835-0220
TX	Richardson, All-American	214-231-5300
TX	Richardson, Bell Inds.	214-690-0466
TX	Richardson, Future Elctrns. Corp.	214-437-2437
TX	Richardson, Zeus Comps., Inc.	214-783-7010
TX	Sugarland, Jaco / Quality Comp.	713-240-2255
UT	Midvale, Bell Inds.	801-255-9611
UT	Salt Lake City, Future Elctrns. Corp.	801-972-8489
WA	Redmond, Future Elctrns. Corp.	206-881-8199
WI	Milwaukee, Marsh	414-475-6000
WI	Waukesha, Bell Inds.	414-547-8879
Can	Alberta, Calgary, Future Elctrns. Corp.	403-235-5325
Can	British Columbia, Vancouver, Future Elctrns. Corp.	604-294-1166
Can	Manitoba, Winnipeg, Future Elctrns. Corp.	204-786-7711
Can	Ontario, Downsview, Future Elctrns. Corp.	416-638-4771
Can	Ontario, Ottawa, Future Elctrns. Corp.	613-820-8313
Can	Quebec, Pointe Claire, Future Elctrns. Corp.	514-694-7710

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Sales Office & Representatives

AL	Huntsville, Electramark	205-830-4400
AZ	Scottsdale, Luscombe Eng.	602-949-9333
CA	Cameron Park, Promerge	916-676-2025
CA	La Mirada, Select Electrns	714-739-8891

CA	Los Angeles, Logic Devices Inc (Southwest Reg)	818-597-8256
CA	San Diego, Earle Assoc.	619-278-5441
CA	San Jose, Promerge	408-453-5544
CO	Denver, AKI	303-338-4488
CT	Fairfield, NRG Limited	203-384-1112
FL	Casselberry, Dyne-A-Mark	407-831-2822
FL	St. Petersburg, Logic Devices Inc (Eastern Reg)	813-579-9992
GA	Norcross, Electramark	404-446-7915
ID	Boise, First Source	208-378-4680
IL	Barrington, Sieger & Assoc.	708-381-7403
IA	Cedar Rapids, Lorenz Sls	319-377-4666
KS	Overland Park, Lorenz Sls	913-469-1312
KS	Wichita, Lorenz Sls	316-721-0500
MD	Gaithersburg, Deltratronics	301-253-0615
MA	Tewksbury, A/D Sales	508-851-5400
MI	Ann Arbor, Applied Data Management	313-741-8558
MI	Chelsa, Applied Data Management	313-475-0523
MI	Ypsilanti, Applied Data Management	313-485-2974
MN	Eden Prairie, Aldridge Assoc. Inc.	612-944-8433
MO	St. Louis, Lorenz Sls	314-997-4558
NE	Lincoln, Lorenz Sls	402-475-4660
NJ	Mahaw, Northeast Comps Co	201-825-0233
NY	E. Amherst, Foster & Wager, Inc	716-688-7864
NY	Endicott, Foster & Wager, Inc	607-748-5963
NY	Liverpool, Foster & Wager, Inc	315-457-7954
NY	Rochester, Foster & Wager, Inc	716-385-7744
NC	Huntsville, Electramark	704-896-8645
OH	Cincinnati, Applied Data Management	513-579-8108
OK	Tulsa, Comptech	918-622-7744
OR	Beaverton, Western Tech Sales	503-629-2082
PA	Blue Bell, Deltatronics	215-641-9930
TX	Brownsville, Comptech	512-542-7474
TX	El Paso, Comptech	915-590-4590
TX	Houston, Comptech	713-492-0005
TX	Irving, Comptech	214-751-1181
VA	Alexandria, Deltratronics	703-971-1733
WA	Bellevue, Western Tech Sales	206-641-3900
WA	Spokane, Western Tech Sales	509-922-7600

Distributors

Can	Ont., Scarborough, JRL Assoc	416-754-3280
Can	Ont., Willowdale, Milgray	416-756-4481
Intl	Denmark, Karslrunde, Distributoren Interelko A/S	45-5314-0700
Intl	England, Berkshire, Abacus Electrns	44-0635-36222
Intl	Finland, Helsinki, OY Comdax AB	35-8067-0277
Intl	France, Paris, A2M	33-1-3954-9113
Intl	Hong Kong, Kowloon, RTI Inds	852-795-7421
Intl	Israel, Petach Tiqva, EIM Intl	972-3-9233257
Intl	Italy, Milano, ITT Distribution (Intesi)	39-2-824701
Intl	Japan, Tokyo, MCM Japan Ltd.	81-3-3487-8477
Intl	Netherlands, Helftheuvelweg, Maxtronix	31-73-210400
Intl	Singapore, Ten Technlg	65-741-8400
Intl	Sweden, Solna, Nortec Elctrns	46-8-7051800
Intl	Switzerland, Dietikon, Ineltro AG	41-74141-21
Intl	West Germany, Munich, Neumuller	49-89-6120-80

LOGICAL SOLUTIONS TECHNOLOGY INC., 96 Shereen Place, Campbell, California 95008, Tel: 408-374-3650

LSI/CSI

FAX: 516-271-0405

LSI COMPUTER SYSTEMS, INC., 1235 Walt Whitman Road, Melville, New York 11747, Tel: 516-271-0400, FAX: 516-271-0405

Sales Office & Representatives

AZ	Phoenix, J.F. Hurlbut Co.	602 952-2079
CA	Rangoon Electrns	916-773-2381
CA	Santa Ana, California Elect. Mktg. Assoc.	714-835-2702
CT	John Griffith	203-344-8296
FL	Solutions	407-777-0994
IN	Marlow Assoc	216-831-8232
MA	Howard C. Jappe Co.	617-245-9359
MN	Roseville, TLC Electrns	612-483-2226
NY	Bensman Upstate Assoc.	716-396-2498
TX	Irving, Kite Electrn Sales	214 986-0321
UT	J.F. Hurlbut Co.	801-595-8818
WI	Stumm Sales	414-276-8886
Can	Ontario, Astec Comps	416-669-4022, 416-663-5520

Distributors

CA	San Jose, Kadah Assoc	408-267-3711
FL	Pro-Formance Elec	407-768-2866
IL	Elmhurst, Belco Electrns	708-953-1115
MI	Thumb Electrns (Music Chips Only)	313-364-6669
Intl	Australia, Park Orchards Vic., Dice Engnr, Pty. Ltd.	61-3-761-1031
Intl	Austria, Vienna, Hantronic Ltd.	43-1-887-171
Intl	Belgium, Hasselt, Lab Electrns Imp. Co.	32 011 272800
Intl	Demark, Stenlose, Lars Vallentin Elektronik Aps	45 42 172 417
Intl	England, Redhill Surrey, Trident Microsystems, Ltd.	44-737-765-900
Intl	France, International Semiconductor Inc.	33-1-4708-3530
Intl	Germany, Scantec GmbH	49-89-8598021
Intl	Hong Kong, Asian Automation Assoc. Ltd.	852-788-5311
Intl	Italy, LaRelco S.R.L.	39-2-89502396
Intl	Italy, Milano, Elcam S.R.L.	39-2-6620090
Intl	Japan, Tokyo, Chiyoda-Ku, J.M.E. Co. Ltd.	81-3-262-1701
Intl	Korea, Seoul, Deyang International Corp.	02 275-8785
Intl	Mexico, Melectro, S.A. de C.V.	52-5-581-2069
Intl	Netherlands, Stadskanaal, Elincom BV	31 05990 14830
Intl	New Zealand, So. Island Comp Centre	64-3-798-833, 64-3-798-835
Intl	Singapore, Real Elec. Inds	65-744-1227
Intl	South Africa, Orange Grove, Suntronika Pty. Ltd.	27 403 3420
Intl	Sweden, Stockholm, Sattco Kompoents	46-8-734-0040
Intl	Switzerland, Dietikon, Datacomp Ag	41 1 740 5140
Intl	Taiwan, Taipei, Seraphim Engnr Co. Ltd.	886-2-593-5195
Intl	Thailand, Bangkok, AK Engnr Ltd.	66-2-513-3813, 66-2-513-1403
Intl	West Germany, Hannover, Topaz Electrn GmbH	49-511-131217, 49-89-859-8021

LSI LOGIC CORPORATION, 1551 Mc Carthy Blvd., Milpitas, California 95035, Tel: 408-433-8000, FAX BACK ONLY: 800-451-2742, TELEX: 171092, FAX: 408-434-6457

Sales Office & Representatives

AL	Huntsville, LSI Logic (Design Resource Ctr)	205-883-3527
CA	Encino, LSI Logic (Design Resource Ctr)	818-379-2400
CA	Irvine, LSI Logic (Design Resource Center)	714-553-5600
CA	San Diego, LSI Logic	619-689-7140
CA	San Jose, LSI Logic	408-954-1561
CO	Denver, LSI Logic	303-399-1112
FL	Boca Raton, LSI Logic (Design Resource Center)	407-395-6200
FL	Melbourne, LSI Logic	407-728-9481
IL	Schaumburg, LSI Logic (Design Resource Center)	708-995-1600
MD	Bethesda, LSI Logic (Design Resource Center)	301-897-5800
MD	Columbia, LSI Logic	410-740-9191
MA	Waltham, LSI Logic (Design Resource Center)	617-890-0180
MN	Minneapolis, LSI Logic (Design Resource Center)	612-921-8300
NJ	Edison, LSI Logic (Design Resource Center)	908-549-4500
NY	New York, LSI Logic	914-226-1620
NY	Victor, LSI Logic	716-223-8820
NC	Raleigh, LSI Logic (Design Resource Center)	919-783-8833
OH	Centerville, LSI Logic	513-438-2821
OR	Beaverton, LSI Logic (Design Resource Center)	503-645-9882
PA	Willow Grove, LSI Logic	215-830-1404
TX	Austin, LSI Logic	512-329-1044
TX	Dallas, LSI Logic (Design Resource Center)	214-788-2966
WA	Bellevue, LSI Logic (Design Resource Center)	206-822-4384
Can	Alberta, Calgary, LSI Logic (Design Resource Center)	403-262-9292
Can	Alberta, Edmonton, LSI Logic (Design Resource Center)	403-450-4400
Can	British Columbia, Burnaby, LSI Logic (Design Resource Center)	604-294-8444
Can	Ontario, Etobicoke, LSI Logic (Design Resource Ctr)	416-620-7400
Can	Ontario, Kanata, LSI Logic (Design Resource Center)	613-592-1263
Can	Quebec, Pointe Claire, LSI Logic (Design Resource Ctr.)	514-694-2417
Intl	Denmark, Copenhagen, EV Johanssen Elctrn AS (Design Resource Center)	45-31-839022
Intl	Finland, Helsinki, Oy Fintronic AB	358-0-6926022
Intl	France, Les Ulis Cedex, Microel SA	33-1-69070824
Intl	France, Paris, LSI Logic S.A. (Design Resource Center)	33-146-206600
Intl	Germany, Bad Camberg, AE Advanced Electrns (Design Resource Ctr)	49-6434-5041
Intl	Germany, Dusseldorf, LSI Logic GmbH (Design Resource Center)	49-211-5961066
Intl	Germany, Magdeburg, AL Advanced Logic GmbH	37-91-48112
Intl	Germany, Munich, LSI Logic GmbH (Design Resource Center)	49-89-9269030
Intl	Germany, Munich, AE Advanced Electrns (Design Resource Ctr)	49-89-9935580
Intl	Germany, Munich, LSI Logic GmbH	49-89-9935580
Intl	Germany, Stuttgart, LSI Logic GmbH (Design Resource Center)	49-711-9889100
Intl	Germany, Stuttgart, AE Advanced Elctrns GmbH	49-711-9889100
Intl	Israel, Ramat Hasharon, LSI Logic Limited (Design Resource Center)	972-3-5403741
Intl	Italy, Plazzo Orione, LSI Logic SPA (Design Resource Ctr)	39-39-6056881
Intl	Japan, Ibaraki, LSI Logic (Design Resource Center)	81-298-52-8371
Intl	Japan, Midori ku Yokohama, LSI Logic (Design Resource Center)	81-45-902-4111
Intl	Japan, Osaka, LSI Logic (Design Resource Center)	81-6-947-5281
Intl	Japan, Tokyo, LSI Logic K.K. (Design Resource Center)	81-33-589-2711
Intl	Japan, Tsukuba-Shi, LSI Logic	81-298-56-5011
Intl	Korea, Seoul, LSI Logic (Design Resource Center)	82-2-561-2921
Intl	Netherlands, LSI Logic/Arcobel B.V. (Design Resource Center)	31-4120-30335
Intl	Norway, Oslo, Art Chip AS	47-2-780740
Intl	Scotland, Livingstone, LSI Logic Ltd. (Design Resource Center)	44-506-416767
Intl	Spain, Madrid, LSI Logic SA	34-1-5705600
Intl	Sweden, Kista, LSI Logic Ltd. (Design Resource Center)	46-8-703-4680
Intl	Switzerland, LSI Logic Sulzer AG Design Resource Ctr)	41-32-536363
Intl	Taiwan, LSI Logic Corp. (Design Resource Center)	886-2-755-3433
Intl	United Kingdom, Berkshire, LSI Logic Ltd. (Design Resource Center)	44-344-426544
Intl	United Kingdom, England, Manhattan Skyline Ltd	44-628-75851

Distributors

AL	Huntsville, Hamilton/Avnet	205-837-9177
AZ	Phoenix, Wyle Labs	602-437-2088
AZ	Phoenix, Hamilton/Avnet (Design Resource Center)	602-961-6401
CA	Calabassas, Wyle Labs (Design Resource Center)	818-880-9000

CA	Chatsworth, Hamilton/Avnet (Design Resource Center)	818-594-0404
CA	Costa Mesa, Hamilton/Avnet (Design Resource Center)	714-641-4100
CA	Gardena, Hamilton/Avnet	310-217-6700
CA	Irvine, Wyle Labs (Design Resource Center)	714-863-9953
CA	Sacramento, Hamilton/Avnet	916-648-3264
CA	San Diego, Hamilton Avnet	619-571-7500
CA	San Diego, Wyle Labs	619-565-9171
CA	Santa Clara, Wyle Labs (Design Resource Center)	408-727-2500
CA	Sunnyvale, Hamilton Avnet (Design Resource Center)	408-743-3300
CO	Denver, Hamilton/Avnet	303-799-0663
CO	Denver, Wyle Labs (Design Resource Center)	303-457-9953
CT	Danbury, Hamilton Avnet	203-797-1100
FL	Miami/Ft.Lauderdale, Hamilton/Avnet	305-979-2802
FL	Orlando, Hamilton/Avnet	407-628-3888
FL	St. Petersburg, Hamilton/Avnet	813-573-3930
GA	Atlanta, Hamilton Avnet	404-447-7500
IL	Chicago, Hamilton/Avnet (Design Resource Center)	708-860-7780
IN	Indiapapolis, Hamilton Avnet	317-844-9333
IA	Cedar Rapids, Hamilton Avnet	319-362-4757
KS	Kansas City, Hamilton/Avnet	913-888-0155
KY	Lexington, Hamilton/Avnet	606-259-1475
MD	Baltimore, Hamilton/Avnet (Design Resource Center)	301-995-3580
MA	Boston, Hamilton/Avnet (Design Resource Center)	508-532-3701
MA	Boston, Wyle Labs (Design Resource Center)	617-272-7300
MI	Detroit, Hamilton/Avnet	313-347-4270
MI	Grand Rapids, Hamilton Avnet	616-243-8805
MN	Minneapolis, Hamilton/Avnet	612-932-0678
MO	Kansas City, Hamilton/Avnet	913-888-0155
MO	St. Louis, Hamilton/Avnet	314-537-4250
NJ	North Jersey, Hamilton Avnet	201-575-3490
NJ	South Jersey, Hamilton Avnet	609-424-0110
NM	Albuquerque, Hamilton Avnet	505-765-1500
NY	Long Island, Hamilton Avnet	516-231-9800
NY	Rochester, Hamilton Avnet	716-475-9140
NY	Syracuse, Hamilton Avnet	315-437-2641
NC	Raleigh, Hamilton/Avnet	919-872-3604
OH	Cleveland, Hamilton/Avnet	216-349-4910
OH	Columbus, Hamilton Avnet	614-882-7389
OH	Dayton, Hamilton Avnet	513-439-6700
OK	Tulsa, Hamilton/Avnet	918-252-7297
OR	Portland, Wyle Labs	503-643-7900
OR	Portland, Hamilton/Avnet	503-526-6200
PA	Pittsburgh, Hamilton/Avnet	412-281-4150
TX	Austin, Hamilton/Avnet	512-832-4306
TX	Austin, Wyle Labs	512-345-8853
TX	Dallas, Hamilton/Avnet	214-404-9906
TX	Dallas, Wyle Labs	214-235-9953
TX	Houston, Hamilton Avnet	713-240-7898
TX	Houston, Wyle Labs	713-879-9953
UT	Salt Lake City, Wyle Labs	801-974-9953
UT	Salt Lake City, Hamilton Avnet	801-972-4300
WA	Seattle, Wyle Labs	206-881-1150
WA	Seattle, Hamilton/Avnet	206-881-6697
WI	Milwaukee, Hamilton Avnet	414-784-4510

MACROCHIP RESEARCH, 1301 N. Denton Drive,
Suite 204, Carrollton, Texas 75006, Tel: 214-242-0450,
FAX: 214-245-1005

MAXIM INTEGRATED PRODUCTS, 120 San
Gabriel Drive, Sunnyvale, California 94086, Tel:
408-737-7600, FAX: 408-737-7194

Sales Office & Representatives

AL	M2i Montgomery Mktg., Inc.	205-830-0498
AZ	Techni Source Inc.	602-497-0711
CA	Pro Assocs., Inc.	408-248-5300
CA	Centaur Corp.	818-591-1655
CA	Centaur Corp	714-261-2123
CA	Mesa,	619-278-8021
CO	Comp Sales	303-779-8060
CT	Comp Rep Assocs	203-230-8369
DE	Tai Corp.	609-778-5353
FL	Sls. Engnrg. Cncpts.	305-426-4601
FL	Sls. Engnrg. Cncpts	407-830-8444
GA	M2i Montgomery Mktg., Inc.	404-447-6124
ID	E.S./Chase	503-292-8840
IL	Heartland Tech. Mktg. Inc.	708-358-6622
IN	Tech. Mktg. Grp.	317-844-8462, 219-432-5553
IA	JR Sls. Engnrg., Inc.	319-393-2232
KS	Deltron	816-436-6445
LA	BP Sales	214-234-8438
MD	Micro-Comp, Inc.	301-644-5700
MA	Comp Rep Assoc.	617-329-3454
MN	Mel Foster Tech Sls, Inc	612-941-9790
MS	M2i Montgomery Mktg., Inc.	205-830-0498
MO	Delltron	314-839-0033
MO	Delltron	816-436-6445
MT	E.S./Chase	503-292-8840
NE	Delltron	816-436-6445
NV	Pro Assoc., Inc.	408-248-5300
NH	Comp Rep Assoc.	617-329-3454
NJ	Parallax	516-351-1000
NJ	TAI Corp.	609-778-5353
NM	Techni Source Inc.	505-268-4232
NY	Parallax	516-351-1000
NY	Reagan/Compar	607-754-2171
NC	M2i Montgomery	919-851-0010, 919-836-1350
OH	Lyons Corp.	513-278-0714
OH	Lyons Corp	216-659-9224
OH	Lyons Corp	614-895-1447
OK	BP Sales	214-234-8438
OR	E.S./Chase	503-292-8840
PA	Lyons Corp.	614-895-1447
PA	Philadelphia, TAI Corp.	609-778-5353
SC	M2i Montgomery Mktg., Inc.	919-851-0010
TN	M2i Montgomery Mktg., Inc.	404-447-6124, 205-830-0498
TX	BP Sales	214-234-8438
TX	BP Sales	713-782-4144
TX	BP Sales	512-346-9186
UT	Luscombe Engnr Co	801-268-3434
VA	Micro-Comp. Inc.	804-239-2626
WA	E.S./Chase	206-823-9535
WI	Heartland Tech Mktg, Inc	414-789-6860
Can	Canada, B.C., Tech Trek	604-276-8735
Can	Canada, Ont., Tech Trek	416-238-0366
Can	Canada, Ont., Tech Trek	613-599-8787
Can	Canada, Que., Tech Trek	514-337-7540
Intl	IRYS	2125-3136
Intl	Argentina, YEL SRL	1372-4163
Intl	Australia, Veltek Pty. Ltd.	03-808-7511
Intl	Austria, Allmos	(02682)-675610
Intl	Belgium, Master Chips	02-219-5862
Intl	Brazil, Intectra	415-967-8818
Intl	China, Comps Agent China Ltd	420-1125
Intl	Denmark, Exatec A/S	44-92-70-00
Intl	Denmark, Exatec A/S	98-63-33-11
Intl	Finland, Yleiselektroniikka Oy	(9)-0-452-621
Intl	France, Maxim France	1-30-609160
Intl	Germany, Maxim GmbH	089-898-1370
Intl	Hong Kong, Dynax Elctrns. Ltd.	4810223
Intl	Hong Kong, Comps Agent, Ltd	4878826
Intl	Israel, Tritech Ltd.	09-917-277
Intl	Italy, Consystem S.r.l.	(02)99041977
Intl	Japan, Maxim Japan Co., Ltd.	(03) 3232-6141
Intl	Japan, Easton	(03)3279-1939
Intl	Korea, Hanaro Corp.	02-516-1144
Intl	Netherlands, Koning En Hartman	015-60-99-06
Intl	New Zealand, Power Technology Comps	981-86478
Intl	Norway, Odin Elctrns AS	(063)-870300
Intl	Singapore/Malaysia/Thailand, Elctrn. Resources Pte. Ltd.	2830888
Intl	South Africa, Fairmont	(011) 886 2920
Intl	Spain, ADM Electrna S.A.	(91)530-4121
Intl	Sweden, Egevo AB	08-795-9650
Intl	Switzerland, Laser & Elctrn. Equip.	01-422-3330
Intl	Taiwan, Solomom Technology Corp.	(02) 7605858
Intl	United Kingdom, Maxim Integrated Products (U.K.) Ltd.	(0734)845255

Distributors

CA	Bell Inds	213-826-6778
NY	Nu Horizons	516-226-6000
NY	Arrow Elctrns	516-391-1300
TX	Hall-Mark Elctrns	214-343-5000
Can	Canada, B.C., Arrow	604-421-2333
Can	Canada, Ont., Arrow	613-226-6903
Can	Canada, Ont., Arrow	416-670-7769
Can	Canada, Que., Arrow	514-421-7411
Intl	France, ASAP	(1) 30 12 20 20
Intl	Germany, Spezial Electrn KG	(05722) 20 30
Intl	Italy, Esco Italiana Elctrns.	(02) 24 09 241
Intl	Japan, Internix, Inc.	(03) 3369-1105
Intl	Japan, Microtek, Inc.	(03)3371-4071
Intl	Japan, Sil-Walker, Inc.	(03) 3341-3651
Intl	United Kingdom, 2001 Elctrn. Comp.	(0438) 742001
Intl	United Kingdom, H.B. Electrns	(0204)25544

FAX: 408-944-0970

MICREL, 1849 Fortune Drive, San Jose, California
95131, Tel: 408-944-0800, FAX: 408-944-0970

Sales Office & Representatives

AL	Huntsville, Electrn Mktg Assoc.	205-880-8050
AZ	Phoenix, Sun State Tech	602-220-0595
CA	La Mirada, Select Elctrns	714-739-8891
CA	Santa Clara, W-J Elctrn Sls	408-982-9222
CA	Solana Beach, D2 Sales Inc.	619-481-9310
CO	Colorado, Comp Sls Inc.	303-779-8060
CO	Denver, Lindberg Co	303-758-9033
CT	Collinsville, Dynamic Sls	203-693-6567
FL	Deerfield Bch., Micro-Elctrn Comps	305-426-8944
FL	Largo, Micro-Elctrn Comps	813-393-5011
FL	Winter Park, Micro-Elctrn Comps	407-740-0023
GA	Atlanta, Electrn Mktg Assocs	404-448-1215
IL	Berkeley, ESA Tech Mktg.	708-544-0120
IN	Batesville, Applied Data Mgmt.	317-257-8949
IA	Cedar Rapids, JR Sls Engnr	319-393-2232
KS	Augusta, Midwest Tech. Sls	316-775-2565
KS	Lenexa, Midwest Tech Sls	913-888-5100
MD	Burgin-Kreh Assocs	410-265-8500
MA	Burlington, Dynamic Sls	617-272-5676
MI	Ann Arbor, Applied Data Mgmt.	313-741-8558
MN	Minneapolis, George Russell Assocs	612-854-1166
MO	Earth City, Midwest Tech Sls	314-298-8787
NV	Las Vegas, ESS Inc	702-597-1661
NJ	Hasbrouck Hgts., Comp Tech Sls	201-288-7400
NM	Albuquerque, Nelco Electronix	505-293-1399
NY	Huntington, Harwood Assocs	516-673-1900
NC	Raleigh, Electrn Mktg Assoc.	919-847-8800
OH	Burton, Crest Comps	216-543-9808
OR	Oswego, SPS Elctrns Inc.	503-697-7768
PA	Trevose, Omega Elctrn Sls	215-244-4000
TX	Austin, Kruvand Assocs. Inc	512-219-9443
TX	Dallas, Kruvand Assocs. Inc	214-437-3355
UT	Salt Lake City, Lindberg Co	801-484-8689
VT	Graniteville, Dynamic Sls	802-476-4223
WA	Mountlake Terrace, SPS Elctrns Inc	206-323-4140
Can	Ont., Brampton, Electrn Sls Professionals (ESP) Inc	416-458-1103
Can	Ont., North Gower, Electrn Sls Professionals (ESP) Inc	613-489-3379
Can	Ont., Ottawa, Electrn Sls Professionals (ESP) Inc	613-567-8547
Can	Ont., Scarborough, Electrn Sls Professionals (ESP) Inc	416-321-9693
Can	Que., Montreal, Electrn Sls Professionals (ESP) Inc	514-388-6596
Intl	Australia, Victoria, R & D Elctrns	61-3-558-0444
Intl	Belgium, Brussel, Microlink S.A.	32-2-5218650
Intl	Denmark, Brondby, Ditz-Schweitzer	45-42-453044
Intl	Finland, Helsinki, Integrated Elctrns Oy Ab	3580-351-3133
Intl	France, Malmaison, ISC France	33-1-47083530
Intl	France, Merignac Cedex, Aquitech	33-1-56551830
Intl	Germany, Deisenhofen, Astronic GmbH	49-89-61303-336
Intl	Germany, Kandel, Kamaka	49-7275-8600
Intl	Germany, Solingen, DACOM West GmbH	49-212-593011
Intl	Hong Kong, Kowloon, Glory Tact Co. Ltd	852-333-3688

Intl	India, Secunderabad, A.P., Samura Elctrns Private Ltd	011-91-842-831344
Intl	Israel, Tirat Yehuda, El-Gev Elctrns Ltd	972-3-9712056
Intl	Italy, Milana, Sprague Italiana SpA	39-2-48012355
Intl	Japan, Tokyo, Nippon Precision Device Corp	81-32-60-1411
Intl	Japan, Tokyo, Nippon Imex Corp	81-3-33218000
Intl	Korea, Seoul, ENC Korea Ltd	82-8-5793330
Intl	Netherlands, Amsterdam, Nijkerk Elektronika BV	31-20-549-5969
Intl	Philippines, Crystalsem Inc	632-79-05-29
Intl	Singapore, QuadRep Mktg (P) Ltd	65-3461933
Intl	So. Africa, Orange Grove, Prime Source (PTY) Ltd	27-11-494-7237
Intl	Spain, Madrid, Unitronics SA	34-1-542-5204
Intl	Sweden, Taby, Lagercrantz Keltech AB	46-8-630-8590
Intl	Switzerland, Electronitel	41-37-410060
Intl	Taiwan, Taipei, Helm Engnr & Trading Co	02-7091888
Intl	U.K. Guildford, Pact Elctrns Ltd	483-502581
Intl	U.K., Kent, Solid State Supplies	44-892-836836
Intl	U.K., Surrey, Profile Elctrns Comps Ltd	44-252-717771
PR	Caguas, Micro-Elctrns Comps/Caribe	809-746-9897

Distributors

AL	Huntsville, Nu Horizons	205-722-9330
AL	Huntsville, Jan Devices, Inc	205-252-2493
AZ	Tempe, Jan Devices, Inc	602-730-5214
CA	Irvine, Integrated Elctrns Corp	714-837-9960
CA	Lakeforest, MCD Elctrns., Inc	714-454-7606
CA	Mission Viejo, Opto Plus # Inc.	714-380-8654
CA	Reseda, Jan Devices Inc.	818-757-2000
CA	Sacramento, Integrated Elctrns Corp	916-363-6030
CA	San Diego, Mock III	619-693-8230
CA	Tustin, HTS Inc	714-259-7733
CO	Denver, QPS Elctrns., Inc	303-373-2766
CO	Denver, Integrated Elctrns Corp	303-292-6121
FL	Altamonte Springs, Nu Horizons	407-831-8008
FL	Ft. Lauderdale, Nu Horizons	305-735-2555
FL	Varico, RM Elctrns Co. Inc	407-767-8005
GA	Atlanta, Jan Devices, Inc	404-676-1421
GA	Norcross, Nu Horizons	404-416-8666
IL	Bensenville, Voyager Elctrns Corp	708-860-1300
IL	Hoffman Estates, Integrated Elctrns Corp	708-843-2040
IL	Schaumburg, QPS Elctrns	708-884-6620
IN	Indianapolis, CAM/RPC Elctrns	317-580-9999
IN	Indianapolis, RM Elctrns	317-291-7110
MD	Columbia, Nu Horizons	410-995-6330
MA	Melrose, Jan Devices, Inc	617-662-3901
MA	Wakefield, Nu Horizons	617-246-4442
MI	Grand Rapids, RM Elctrns	616-531-9300
MI	Grand Rapids, Calder Elctrns	616-698-7400
MN	Fridley, Voyager Elctrns Corp	612-571-7766
NV	Las Vegas, Competitive Comps	702-878-7881
NJ	Mt. Laurel, Nu Horizons	609-231-0900
NJ	Pine Brook, Nu Horizons	201-882-8300
NY	Amityville, Nu Horizons	516-226-6000
NY	Rochester, Nu Horizons	716-292-0777
NY	Rochester, CAM/RPC Elctrns	716-427-9999
OH	Cleveland, CAM/RPC Elctrns	216-461-8259
OH	Solon, Nu Horizons	216-349-2008
OH	Worthington, CAM/RPC Elctrns	614-888-7777
OR	Beaverton, Integrated Elctrns Corp	503-641-1690
OR	Beaverton, Salestech Assocs	503-643-2206
PA	Pittsburg, CAM/RPC Elctrns	412-782-3770
TX	Farmersbranch, US Connections Inc	214-247-0012
UT	W. Valley City, Integrated Elctrns Corp	801-977-9750
WA	Bellevue, Integrated Elctrns Corp	206-455-2727
WA	Redmond, Salestech Assocs	206-869-5412
WA	Tukwila, Vesco	206-575-3607
WI	Mequon, Taylor Elec Co	414-241-4321
Can	Ont., Brampton, Electrn Sls Professionals (ESP) Inc	416-458-1103
Can	Ont., North Gower, Electrn Sls Professional (ESP) Inc	613-489-3379
Can	Ont., Ottawa, Electrn Sls Professionals (ESP) Inc	613-567-8547
Can	Ont., Scarborough, Electrn Sls Professionals (ESP) Inc	416-321-9693
Can	Que., Montreal, Electrn Sls Professionals (ESP) Inc	514-388-6596
Intl	Australia, Victoria, R & D Elctrns.	61-3-558-0444
Intl	Belgium, Brussel, Microlink S.A.	32-2-5218650
Intl	Denmark, Brondby, Ditz Schweitzer	45-42-453044
Intl	Finland, Helsinki, Integrated Elctrns Oy AB	3580-351-3133
Intl	France, Malmaison, ISC France	33-1-47083530
Intl	France, Merignac Cedex, Aquitech	33-1-56551830
Intl	Germany, Deisenhofen, Astronic GmbH	49-89-61303-336
Intl	Germany, Kandel, Kamaka	49-7275-8600
Intl	Germany, Solingen, Dacom West GmbH	49-212-593011
Intl	Hong Kong, Kowloon, Glory Tact Co. Ltd	852-333-3688
Intl	India, Secunderabad, A.P., Samura Elctrns Private Ltd	011-91-842-831344
Intl	Israel, Tirat Yehuda, El-Gev Elctrns Ltd	972-3-9712056
Intl	Italy, Milano, Sprague Italiana SpA	39-2-48012355
Intl	Japan, Tokyo, Nippon Precision Device Corp	81-32-60-1411
Intl	Japan, Tokyo, Nippon Imex Corp	81-3-3321800
Intl	Korea, Seoul, ENC Korea Ltd	82-2-5793330
Intl	Netherlands, Amsterdam, Nijkerk Elektronika BV	31-20-549-5969
Intl	Philipines, Crystalsem Inc.	632-79-05-29
Intl	Singapore, QuadRep Mktg (P) Ltd	65-3461933
Intl	So. Africa, Orange Grove, Prime Source (PTY) Ltd	27-11-494-7237
Intl	Spain, Madrid, Unitronics S.A.	34-1-542-5204
Intl	Sweden, Taby, Lagerkrantz Keltech AB	46-8-630-8590
Intl	Switzerland, Electronitel	41-37-410060
Intl	Taiwan, Taipei, Helm Engnr & Trading Co	02-7091888
Intl	U.K., Guildford, Pact Elctrns Limited	483-502581
Intl	U.K., Surrey, Profile Elctrn Comps Ltd	44-252-717771
Intl	U.K.,Kent, Solid State Supplies	44-892-836836

MICRO LINEAR, 2092 Concourse Dr., San Jose, California 95131, Tel: 408-433-5200, FAX: 408-432-0295

Sales Office & Representatives

AL	Huntsville, Montgomery Mktg, Inc	205-830-0498
AZ	Phoenix, Sun State Tech, Inc	602-220-0595
CA	Mt. View, Taarcom, Inc	415-960-1550
CA	Roseville, Taarcom, Inc	916-782-1776
CA	San Diego, Littlefield & Smith Assocs	619-455-0055
CA	San Jose, Micro Linear Corp	408-433-5200
CA	Tustin, Dynarep, Inc	714-258-8002
CA	Woodland Hills, Dynarep, Inc	818-346-2200
CO	Englewood, Elcom, Inc	303-792-3330
FL	Ft. Lauderdale, VG Sales	305-938-4333
FL	Largo, VG Sales	813-536-7787
FL	Mattland, VG Sales	407-831-8688
GA	Norcross, Montgomery Mktg, Inc	404-447-6124
IL	Western Springs, Corlinear Rep., Inc	708-784-1100
IA	Cedar Rapids, R.F. Welch Co	319-362-6824
KS	Overland Park, Electri-Rep, Inc	913-649-2168
MA	Burlington, Genesis	617-270-9540
MA	Framingham, Micro Linear Corp	508-875-9186
MI	Ann Arbor, Applied Data Management	313-741-8558
MI	Highland, Applied Data Management	313-889-3276
MN	Edina, Gibb Technlg Sales	612-835-3370
MO	St. Louis, Electri-Rep, Inc	314-993-4421
NJ	Cherry Hill, Trinkle Sales, Inc	609-795-4200
NJ	Fairfield, Tech Applications & Mktg	201-575-4130
NM	Albuquerque, Reptronix Ltd	505-292-1718
NY	Cicero, T-Squared Elctrns Co., Inc	315-699-1559
NY	Victor, T-Squared Elctrns Co., Inc	716-924-9101
NC	Raleigh, Montgomery Mktg, Inc	919-851-0010
OH	Cincinnati, Applied Data Management	513-579-8108
OK	Catoosa, Comptech Sales, Inc.	918-266-1966
OR	Beaverton, Electra Tech Sales, Inc	503-643-5074
TX	Austin, Comptech Sales, Inc	512-343-0300
TX	Dallas, Micro Linear Corp	214-234-6140
TX	El Paso, Comptech Sales, Inc	915-590-4590
TX	Houston, Comptech Sales, Inc	713-492-0005
TX	Irving, Comptech Sales, Inc	214-751-1181
UT	Murray, Elcom, Inc	801-262-2400
WA	Kirkland, Electra Tech Sales, Inc	206-821-7442
Intl	Singapore, Micro Linear Corp	011-65-773-3150
PR	Mayaguez, VG Sales	809-831-4150

Distributors

AL	Huntsville, Pioneer Technlg	205-837-9300
AZ	Tempe, Insight Elctrns, Inc	602-829-1800
CA	Irvine, Insight Elctrns., Inc	714-727-3291
CA	San Diego, Insight Elctrns., Inc	619-587-1100
CA	San Jose, Pioneer Tech. Prods	408-954-9100
CA	Sunnyvale, Insight Elctrns., Inc	408-720-9222
CA	Westlake Village, Insight Elctrns., Inc	818-707-2101
CO	Englewood, Insight Elctrns., Inc	303-649-1800
FL	Altamonte Springs, Pioneer Technlg	407-834-9090
FL	Deerfield Bch, Pioneer Technlg	305-428-8877
GA	Duluth, Pioneer Technlg	404-448-1711
MD	Gaithersburg, Pioneer Technlg	301-921-0660
MA	Hopkinton, Interface Elctrns Corp	508-435-0100
NJ	Marlton, Interface Elctrns. Corp	609-988-5448
NC	Charlotte, Pioneer Technlg	704-527-8188
NC	Durham, Pioneer Technlg	919-544-5400
OR	Beaverton, Insight Elctrns., Inc	503-644-3300
PA	Horsham, Pioneer Technlg	215-674-4000
PA	Malvern, Interface Elctrns., Corp	215-889-2060
TX	Austin, Insight Elctrns., Inc	512-467-0800
TX	Richardson, Insight Elctrns., Inc	214-783-0800
TX	Sugarland, Insight Elctrns., Inc	713-879-0577
WA	Kirkland, Insight Elctrns., Inc	206-820-8100
Can	B.C., Burnaby, Vitel Elctrns	604-439-9889
Can	Ont., Kanata, Vitel Elctrns	613-592-0090
Can	Ont., Mississauga, Vitel Elctrns	416-564-9720
Can	Que., Lachine, Vitel Elctrns	514-636-5951
Intl	Australia, Neutral Bay NSW, Reptechnic	011-612-953-9844
Intl	Belgium, Bruxelles, Masterchips	011-322-219-5862
Intl	Denmark, Lynge, Prescom	011-45-4218-9800
Intl	France, Les Ulis Cedex, Micro Puissance	011-33-1-6907-1211
Intl	Germany, Heidenheim, Ineltek GmbH	011-49-7321-20077
Intl	Hong Kong, National City Intl	011-852-407-4216
Intl	Hong Kong, Aberdeen, Maxvale Co. Ltd	011-852-555-3310
Intl	Israel, Tel Aviv, Tritech Ltd	011-972-3-544-7293
Intl	Italy, Milano, MicroElit S.P.A.	011-39-2-4817900
Intl	Japan, Tokyo, Nippon IC., Inc	011-81-3-402-5280
Intl	Korea, Seoul, Se Wung Corp	011-82-2-701-5278
Intl	Singapore, Technlg. Distbn. PTE Ltd	011-65-299-7811
Intl	Sweden, Stockholm, Dipcom Electrns AB	011-46-8-644-9190
Intl	Switzerland, Dietikon, Altrac AG	011-411-741-4644
Intl	Taiwan, Taipei, Irtronic Corp	011-886-2-531-5467
Intl	U.K., Thame, Oxon, Ambar Comps	011-44-844-261-144

MICRO NETWORKS

FAX: 508-853-8296

MICRO NETWORKS COMPANY, Division of Unitrode Corp., 324 Clark Street, Worcester, Massachusetts 01606, Tel: 508-852-5400, FAX: 508-853-8296

Sales Office & Representatives

AL	Huntsville, EMA, Inc.	205-880-8050
AZ	Scottsdale, Pinnacle Comp Sales	602-994-0441
CA	Irvine, Spectrum Rep Co	714-453-1525
CA	Milpitas, Marcon Sales	408-263-3660
CA	San Diego, Hadden Assoc, Inc.	619-565-9444
CO	Denver, Alliance Elctrns	303-433-1648
FL	Oviedo, Conley & Assoc., Inc.	407-365-3283
GA	Atlanta, EMA, Inc.	404-448-1215

ID	Boise, James J. Backer Co.	208-343-9831
IL	Highland Park, Mid-Tek Mktg	708-831-1130
IN	Ft. Wayne, Corrao & Marsh	219-482-2725
IN	Greenfield, Corrao & Marsh	317-462-4446
IA	Cedar Rapids, Midwest Tech. Sls.	319-377-1688
KS	Lenexa, Midwest Tech. Sls.	913-888-5100
MD	Falls Church, SJ Assocs.	301-583-8353
MA	Worcester, Micro Networks	508-852-5400
MI	Farmington Hills, Tritech	313-442-1206
MN	Eden Prairie, Aldridge and Assocs.	612-944-8433
MO	Earth City, Midwest Tech. Sls.	314-298-8787
NJ	Mt. Laurel, Wyck Mktg	609-727-1070
NY	Liverpool, Foster & Wager	315-457-7954
NY	Rockville Centre, S-J Sales Assoc., Inc.	516-536-4242
NC	Raleigh, EMA, Inc.	919-847-8800
OH	Centerville, Omega	513-434-5507
OK	Tulsa, Comp Tech	918-622-7744
OR	Beaverton, James J. Backer Co.	503-627-0775
SC	Greenville, EMA, Inc.	803-233-4637
TX	Houston, Comp Tech	713-492-0005
TX	Irving, Comptech	214-751-1181
UT	Bountiful, Anderson Assoc.	801-292-8991
VA	Falls Church, SJ Assocs.	703-533-2233
WA	Seattle, James J. Backer Co.	206-285-1300
Can	Quebec, Lachine, Vitel Electrns	514-636-5951
Intl	Hong Kong, Kowloon, Unitrode Electrns Asia, Ltd.	852-3-722-1101
Intl	Italy, Milano, Unitrode S.R.L.	39-2-48007831
Intl	United Kingdom, London, Unitrode (U.K.) Ltd.	44-81-318-1431
Intl	West Germany, Unterhaching, Unitrode Electrns GmbH	49-89-619004

MICRO POWER SYSTEMS, INC., 3100 Alfred Street, Santa Clara, California 95056, Tel: 408-727-5350, FAX: 408-562-3605

Sales Office & Representatives

AL	Huntsville, R.W. Mitscher Co.	205-464-0745
AZ	Phoenix, Sunwest Mktg	602-893-6288
CA	Irvine, Micro Power Sys (Western Reg)	714-559-6179
CA	San Diego, Littlefield & Smith Assoc.	619-455-0055
CA	Santa Ana, Unitec Sls, Inc	714-556-8661
CA	Santa Clara, Micro Power Sys, Inc	408-727-5350
CO	Littleton, Lange Sales, Inc	303-795-3600
CT	Cheshire, Connecticut Applied Technlg	203-272-6564
FL	Orlando, Comps Design Mktg	407-240-3903
GA	Lawrenceville, R.W. Mitscher Company	404-923-3239
ID	Boise, Lange Sales Inc.	208-323-0713
IL	Glendale Heights, Synergistic Sales	708-858-8686
IN	Carmel, R.L. Bontempo Assocs., Inc.	317-843-2142
IN	Ft. Wayne, R.L. Bontempo Assocs., Inc.	219-478-1057
KS	Olathe, G.M.Brown & Assoc	913-829-3086
MD	Towson, Advanced Technlg Sls., Inc	410-296-9360
MA	Waltham, Datcom	617-891-4600
MI	Brighton, Electrn Sources, Inc	313-227-3598
MN	Minneapolis, TekRep	612-832-0277
MO	Florissant, G.M.Brown & Assoc	314-839-3600
NH	Hampstead, Micro Power Sys (No. East Reg)	603-329-4272
NJ	Hasbrouck Heights, Comp-Tech Sales	201-288-7400
NY	E. Syracuse, Electra Sls Corp	315-463-1248
NY	Rochester, Electra Sls Corp	716-427-7860
NC	Davidson, R.W. Mitscher Company Inc.	704-896-7434
NC	Raleigh, R.W. Mitscher Company Inc.	919-848-0941
OH	Dayton, K.W. Electrn Sales	513-890-2150
OH	Shaker Heights, K.W. Electrn Sales	216-491-9177
OR	Beaverton, Sales Tech Assoc	503-643-2206
PA	Allison Park, K.W. Electrn Sales	412-492-0777
PA	Willow Grove, Tech Sls Assocs	215-784-0170
TN	Johnson City, R.W. Mitscher Company Inc.	615-929-7258
TX	Austin, Synergistic Sales, Inc.	512-346-2122
TX	Houston, Synergistic Sales, Inc.	713-937-1990
TX	Plano, Micro Power Sys (Central-So. East Reg)	214-235-2699
TX	Richardson, Synergistic Sales, Inc.	214-644-3500
UT	Salt Lake City, Lange Sales Inc.	801-487-0843
VA	Richmond, Advanced Technlg Sls., Inc	804-320-8756
WA	Redmond, Sales Tech Assoc	206-869-5412
WI	Brookfield, Synergistic Sales	414-821-1516
Can	British Columbia, N. Vancouver, Tracan Electrns Western	604-984-4141
Can	Ontario, Mississauga, Designtronics	416-564-7111
Can	Quebec, Pointe Claire, Designtronics	514-695-3124
Intl	Australia, Leichhardt NSW, Braemac Pty Ltd	02-564-1211
Intl	Austria, Wien, Ing. Otto Folger GES M.B.H.	01-402-51-21
Intl	Belgium, Antwerp, Trade Mark Elctrns BVBA	03-325-19-10
Intl	Denmark, Bagsvaerd, Alfa Tech Comp AS	44-37-71-00
Intl	Finland, Espoo, Yleiselektroniikka OY	358-0-4526-21
Intl	France, Antony, C.C.I.	1-46-74-47-00
Intl	France, Le Chesnay, A2M SA	1-39-54-91-13
Intl	France, Les Ulis, Micro Power Sys, S.A.	33-16928-3131
Intl	France, Les Ulis Cedex, Microel S.A.	1-69-07-08-24
Intl	Germany, Ismaning, Dacom Electrn Vertriebs GmbH	089-99-65-49-0
Intl	Germany, Kandel, Kamaka Electrn GmbH	07275-86-00
Intl	Germany, Munchen, Avnet E2000	089-45110-256
Intl	Germany, Osnabrueck, Milgray Elektronik Vertriebs GmbH	0541-139-08-0
Intl	Hong Kong, Kowloon, Nanco Elctrns Supply Ltd	852-765-3000
Intl	Hong Kong, Kowloon, Tekcomp Elctrns Ltd	852-710-8121
Intl	India, Secunderabad, Samura Elctrns PVT., Ltd	91-842-862453
Intl	Israel, Tel Aviv, Star Tronics	3-260148/9
Intl	Italy, Velco	39-444-922922
Intl	Japan, Kawasaki-Shi, Micro Power Sys, K.K.	81-44922-9411
Intl	Korea, Seoul, Mainsail Mercantile Ltd	822-745-2761
Intl	Netherlands, Dordrecht, Added Value Elctrns BV	078-13-82-88
Intl	Norway, Oslo, Henaco A/S	22-16-21-10
Intl	Singapore, Serial Sys Pte Ltd	65-280-0200
Intl	So. Africa, Transvaal, Pace Elctrn Comps (Pty) Ltd	974-12-11
Intl	Spain, Barcelona, Venco Electrna	34-3-2633354
Intl	Sweden, Vallingby, Setron AB	46-8-89-1125
Intl	Switzerland, Zug, Anatec A.G.	042-41-24-41
Intl	Taiwan, Taipei, Helm Engnr & Trading	7091888
Intl	U.K., England, Quarndon Elctrns Ltd	0332-32651
Intl	U.K., England, Force Technlgs Ltd	0256-880788
Intl	United Kingdom, England, Surrey, Micro Power Sys, LTD.	44-932-857315
Intl	West Germany, Muenchen, Micro Power Sys, GMBH	49-89-83-7091

Distributors

AL	Huntsville, Marshall Inds	205-881-9235
AZ	Phoenix, Marshall Inds	602-496-0290
CA	Calabasas, Marshall Inds	818-878-7000
CA	Camarillo, Milgray Electrns, Inc.	805-484-4055
CA	El Monte, Marshall Inds	818-307-6000
CA	Irvine, Marshall Inds	714-859-5050
CA	Irvine, Milgray Electrns, Inc.	714-753-1282
CA	Milpitas, Marshall Inds	408-942-4600
CA	Rancho Cordova, Marshall Inds	916-635-9700
CA	Reseda, JAN Devices, Inc.	818-708-1100
CA	San Diego, Marshall Inds	619-627-4140
CA	San Jose, Merit Electrns Inc	408-434-0800
CO	Thornton, Marshall Inds	303-451-8383
CT	Milford, Milgray Electrns Inc.	203-878-5538
CT	Wallingford, Marshall Inds	203-265-3822
FL	Altamonte Springs, Marshall Inds	407-767-8585
FL	Ft. Lauderdale, Marshall Inds	305-977-4880
FL	Lake Mary, Milgray Electrns Inc.	407-321-2555
FL	Miami, All American, Inc.	305-621-8282
FL	Orlando, Chip Supply, Inc.	407-298-7100
FL	St. Petersburg, Marshall Inds	813-573-1399
FL	Sunrise, All American, Inc.	305-572-7999
GA	Norcross, Marshall Inds	404-923-5750
GA	Norcross, Milgray Electrns Inc.	404-446-9777
IL	Palatine, Milgray Electrns Inc.	708-202-1900
IL	Schaumburg, Marshall Inds	708-490-0155
IN	Indianapolis, Marshall Inds	317-297-0483
KS	Lenexa, Marshall Inds	913-492-3121
KS	Overland Park, Milgray Electrns Inc.	913-236-8800
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MA	Norwood, Gerber Electrns	617-769-6000
MA	Wilmington, Marshall Inds	508-658-0810
MA	Wilmington, Milgray Electrns Inc.	508-657-5900
MI	Livonia, Marshall Inds	313-525-5850
MN	Plymouth, Marshall Inds	612-559-2211
MO	Bridgeton, Marshall Inds	314-291-4650
NJ	Fairfield, Marshall Inds	201-882-0320
NJ	Marlton, Milgray Electrns Inc.	609-983-5010
NJ	Mt. Laurel, Marshall Inds	609-234-9100
NJ	Parsippany, Milgray Electrns Inc.	201-335-1766
NY	Endicott, Marshall Inds	607-785-2345
NY	Farmingdale, Milgray Electrns Inc	516-420-9800
NY	Hauppauge, Marshall Inds	516-273-2424
NY	Pittsford, Milgray Electrns Inc.	716-381-9700
NY	Rochester, CAM RPC Electrns	716-436-5070
NY	Rochester, Marshall Inds	716-235-7620
NC	Raleigh, Marshall Inds	919-878-9882
NC	Raleigh, Milgray Electrns Inc.	919-790-8094
OH	Cleveland, Milgray Electrns Inc.	216-447-1520
OH	Dayton, Marshall Inds	513-898-4480
OH	Highland Heights, CAM RPC Electrns	216-461-4700
OH	Solon, Marshall Inds	216-248-1788
OR	Beaverton, Marshall Inds	503-644-5050
PA	Pittsburgh, CAM RPC Electrns	412-963-6202
TX	Austin, Marshall Inds	512-837-1991
TX	Carrollton, Marshall Inds	214-770-0602
TX	Dallas, Milgray Electrns Inc	214-248-1603
TX	Houston, Marshall Inds	713-467-1666
TX	Richardson, Marshall Inds	214-705-0600
TX	Stafford, Milgray Electrns Inc.	713-240-5360
UT	Murray, Milgray Electrns,Inc	801-261-2999
UT	Salt Lake City, Marshall Inds	810-973-2288
WA	Bothell, Marshall Inds	206-486-5747
WI	Waukesha, Marshall Inds	414-797-8400
Can	Ontario, Brampton, Marshall Inds	416-458-8046
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Can	Quebec, Pointe Claire, Marshall Inds	514-694-8142
Can	Quebec, Pointe Claire, Milgray Electrns	514-426-5900
Intl	Australia, Leichhardt, NSW, Braemac Pty Ltd	02-564-1211
Intl	Austria, Wien, Ing. Otto Folger GES M.B.H.	01-402-51-21
Intl	Belgium, Antwerp, Trade Mark Elctrns BVBA	03-325-19-10
Intl	Denmark, Bagsvaerd, Alfa Tech Comp AS	44-37-71-00
Intl	Finland, Espoo, Yleiselektroniikka OY	358-0-4526-21
Intl	France, Antony, C.C.I.	1-46-74-47-00
Intl	France, Le Chesnay, A2M SA	1-39-54-91-13
Intl	France, Les Ulis Cedex, Microel S.A.	1-69-07-08-24
Intl	Germany, Ismaning, Dacom Electrn Vertriebs GmbH	089-99-65-49-0
Intl	Germany, Kandel, Kamaka Electrn GmbH	07275-86-00
Intl	Germany, Munchen, Avnet E2000	089-45110-256
Intl	Germany, Osnabrueck, Milgray Elektronik Vertriebs GmbH	0541-139-08-0
Intl	Hong Kong, Kowloon, Nanco Elctrns Supply Ltd	852-765-3000
Intl	Hong Kong, Kowloon, Tekcomp Elctrns Ltd	852-710-8121
Intl	India, Secunderabad, Samura Elctrns PVT., Ltd	91-842-862453
Intl	Israel, Tel Aviv, Star Tronics	3-260148/9
Intl	Italy, Velco	39-444-922922
Intl	Korea, Seoul, Mainsail Mercanatile Ltd	822-745-2761
Intl	Netherlands, Dordrecht, Added Value Elctrns BV	078-13-82-88
Intl	Norway, Oslo, Henaco A/S	22-16-21-10
Intl	Singapore, Serail Sys Pte Ltd	65-280-0200

Intl	So. Africa, Transvaal, Pace Elctrn Comps (Pty) Ltd	974-12-11
Intl	Spain, Barcelona, Venco Electrna	34-3-2633354
Intl	Sweden, Vallingby, Setron AB	46-8-89-1125
Intl	Switzerland, Zug, Anatec A.G.	042-41-24-41
Intl	Taiwan, Taipei, Helm Engnr & Trading	7091888
Intl	U.K., England, Quarndon Elctrns Ltd	0332-32651
Intl	U.K., England, Force Technlgs Ltd	0256-880788

MICRO-REL, 2343 W. 10th Place, Tempe, Arizona 85281, Tel: 602-968-6411

MICROBAR SYSTEMS INC., 785 Lucerne Drive, Sunnyvale, California 94086, Tel: 408-720-9300, FAX: 910-373-2047

MICROCHIP TECHNOLOGY, INC., 2355 West Chandler Boulevard, Chandler, Arizona 85224-6199, Tel: 602-786-7200, TWX: 910-950-1963, FAX: 602-899-9210

Sales Office & Representatives

AL	Huntsville, Electramark	205-830-4400
AZ	Chandler, Microchip Technlg Inc (Corporate)	602-786-7200
AZ	Scottsdale, Western High Tech Mktg	602-860-2702
CA	Costa Mesa, Competitive Technlg	714-540-5501
CA	Escondido, Eagle Tech Sls	619-743-6550
CA	Sunnyvale, Trinity Technlg	408-733-9000
CO	Westminster, Western Region Mktg	303-428-8088
CT	Stratford, VistAssoc	203-375-5456
FL	Altamonte Springs, Electramark Inc.	407-830-0844
FL	Plantation, Electramark Inc	305-424-2872
FL	Tampa, Electramark, Inc.	813-962-1882
GA	Marietta, Microchip Technlg Inc	404-509-8800
GA	Norcross, Electramark	404-446-7915
IL	Itasca, Janus Inc	708-250-9650
IN	Fort Wayne, Electro Reps Inc.	219-489-8205
IN	Indianapolis, Electro Reps Inc.	317-842-7202
IA	Ceddar Rapids, Spectrum Sls	319-366-0576
KS	Overland, Spectrum Slks	913-648-6811
MD	Columbus, Delta III Assocs Inc	301-730-4700
MA	Framingham, Microchip Technlg Inc	508-820-3334
MA	Marlborough, VistAssoc	508-481-9277
MI	Farmington Hills, J.L. Montgomery Assoc	313-489-0099
MI	Grand Rapids, JL Montgomery Assoc Inc	616-676-8880
MN	Eden Prairie, Comp.Tech Sales, Inc.	612-941-7181
MO	Florissant, Spectrum Sls	314-921-1313
NJ	Cherry Hill, Tritek Sales	609-667-0200
NY	Hauppauge, Microchip Technlg Inc	516-273-5305
NY	Melville, Parallax	516-351-1000
NY	Rochester, Apex Assoc	716-272-7040
NC	Raleigh, Zucker Assoc	919-782-8433
OH	Cincinnati, TMC Electrns	513-271-3860
OH	Middleburg Hghts., TMC Electrns	216-885-5544
OK	Tulsa, Comptech Sales, Inc.	918-622-7744
OR	Beaverton, Micro Sls	503-645-2841
TX	Austin, Comptech Sales, Inc.	512-343-0300
TX	El Paso, Comp Tech Sales Inc.	915-590-4590
TX	Houston, Comptech Sales, Inc.	713-492-0005
TX	Irving, Comptech Sales	214-751-1181
UT	Salt Lake City, Western Region Mktg	801-268-9768
WA	Bellevue, Micro Sls	206-451-0568
WI	Delafield, Janus, Inc.	414-646-5420
Can	Alberta, Calgary, Enerlec Sales Ltd	403-256-3627
Can	British Columbia, Richmond, Enerlec Sales, Ltd.	604-273-0882
Can	Ontario, Nepean, Dynasty Comps, Inc.	613-723-0671
Can	Ontario, Toronto, Dynasty Comps, Inc.	416-587-2278
Can	Quebec, Pointe Claire, Dynasty Comps, Inc.	514-984-5342
Intl	Brazil, Sao Paulo, Aplicacoes Electrnas Artimar	231-0277
Intl	France, Massy, Arizona Microchip Technlg SARL	1-69-30-90-90
Intl	Germany, Ottobrunn, Arizona Microchip Technlg GmbH	089-609-6072
Intl	Hong Kong, Kwai Foong, Excell Assoc. Ltd.	852-418-0909
Intl	Ireland, Youghal, Eltech Agencies Ltd	24-97172
Intl	Japan, Kanagawa, Microchip Technlg Intl Inc	81-45-471-6166
Intl	Korea, Seoul, Memec (Asia Pacific) Ltd	82-2-563-5277
Intl	Singapore, Memec (Asia Pacific) Ltd	65-222-4962
Intl	Taiwan, R.O.C. Taipei, Memec (Asia Pacific) Ltd	886-2-7602028
Intl	U.K., Bucks, Arizona Microchip Technlg Ltd	0628-851077

Distributors

AL	Huntsville, Pioneer Technlgs	205-837-9300
AL	Huntsville, Reptron Electrns	205-722-9500
AL	Huntsville, Hall-Mark Electrns	205-837-8700
AZ	Phoenix, Hall-Mark Electrns	602-437-1200
AZ	Tempe, Bell Inds	602-966-7800
CA	Agoura Hills, Bell Inds	818-879-9494
CA	Carlsbad, Aeges Electrn	619-729-2026
CA	Chatsworth, Hall-Mark Electrns	818-773-4500
CA	Cypress, Bell Inds	714-895-7801
CA	Gardena, Microchip Technlg Inc	310-323-1888
CA	Irvine, Pioneer Standard	800-535-1430
CA	Irvine, Hall-Mark Electrns	714-727-6000
CA	Rocklin, Hall-Mark Electrns	916-624-9781
CA	Sacramento, Bell Inds	916-652-0414
CA	San Diego, Future Electrns	619-625-2800
CA	San Diego, Bell Inds	619-268-1277
CA	San Diego, Hall-Mark Electrns	619-268-1201
CA	San Jose, Hall-Mark Electrns	408-432-4000
CA	San Jose, Future Electrns, Inc.	408-434-1122
CA	San Jose, Pioneer Tech Prods	408-954-9100
CA	San Jose, Microchip Technlg Inc	408-436-7950
CA	Sunnyvale, Bell Inds	408-734-8570
CA	Woodland Hills, Pioneer Standard	800-535-1430
CO	Broomfield, Future Electrns	303-421-0123
CO	Denver, Bell Inds	303-691-9010
CO	Englewood, Hall-Mark Electrns	303-790-1662
CT	Bethel, Future Electrns	203-743-9594
CT	Cheshire, Hall-Mark Electrns	203-271-2844
CT	Shelton, Pioneer Standard	203-929-5600
FL	Altamonte Springs, Vantage Comps	407-682-1199
FL	Altamonte Springs, Pioneer Technlgs	407-834-9090
FL	Casselberry, Hall-Mark Electrns	407-830-5855
FL	Deerfield Bch, Pioneer Standard	305-428-8877
FL	Deerfield Beach, Vantage Comps	305-429-1001
FL	Ft. Lauderdale, Reptron Electrns	305-735-1112
FL	Largo, Hall-Mark Electrns	813-541-7440
FL	Pompano Beach, Hall-Mark Electrns	305-971-9280
FL	Tampa, Reptron Electrns	813-854-2351
GA	Duluth, Hall-Mark Electrns	404-623-4400
GA	Duluth, Pioneer Technlgs	404-623-1003
GA	Norcross, Reptron Electrns	404-446-1300
IL	Addison, Pioneer Standard	708-495-9680
IL	Elgin, Microchip Technlg Inc	708-741-0171
IL	Elk Grove Vill, Bell Inds	708-640-1910
IL	Wood Dale, Hall-Mark Electrns	708-860-3800
IN	Ft. Wayne, Bell Inds	219-422-4300
IN	Indianapolis, Pioneer Standard	317-573-0880
IN	Indianapolis, Bell Inds	317-875-8200
IN	Indianapolis, Hall-Mark Electrns	317-872-8875
KS	Lenexa, Hall-Mark Electrns	913-888-4747
MD	Columbia, Vantage Comps	301-720-5100
MD	Columbia, Hall-Mark Electrns	301-988-9800
MD	Gaithersburg, Pioneer Technlgs	301-921-0660
MA	Andover, Vantage Comps	508-687-3900
MA	Billerica, Hall-Mark Electrns	617-667-0902
MA	Bolton, Future Electrns	508-779-3000
MA	Lexington, Pioneer Standard	617-861-9200
MI	Livonia, Future Electrns	313-261-5270
MI	Livonia, Hall-Mark Electrns	313-462-1205
MI	Livonia, Pioneer Standard	313-525-1800
MN	Bloomington, Hall-Mark Electrns	612-881-2600
MN	Eden Prairie, Pioneer Standard	612-944-3355
MN	Thief River Falls, Digi-Key Corp	218-681-6674
MO	Earth City, Hall-Mark Electrns	314-291-5350
MO	St. Louis, Future Electrns	314-469-6805
NJ	Clifton, Vantage Comps	201-777-4100
NJ	Fairfield, Pioneer Standard	201-575-3510
NJ	Morristown, Hall-Mark Electrns	609-235-1900
NJ	Parsipanny, Hall-Mark Electrns	201-515-3000
NM	Albuquerque, Alliance Elctrns Inc	505-275-6335
NM	Albuquerque, Bell Inds	505-292-2700
NY	Binghampton, Pioneer Standard	607-722-9300
NY	Fairport, Pioneer Standard	716-381-7070
NY	Fairport, Hall-Mark Electrns	716-425-3300
NY	Liverpool, Future Electrns	315-451-2371
NY	Rochester, Future Electrns	716-272-1120
NY	Ronkonkomo, Hall-Mark Electrns	516-737-0600
NY	Smithtown, Vantage Comps	516-543-2000
NY	Woodbury, Seymour Electrns	516-496-2042
NY	Woodbury, Pioneer Standard	516-921-8700
NC	Charlotte, Future Electrns	704-529-5500
NC	Morrisville, Pioneer Technlgs	919-460-1530
NC	Raleigh, Future Electrns	919-790-7111
NC	Raleigh, Hall-Mark Electrns	919-872-0712
OH	Cleveland, Pioneer Standard	216-587-3600
OH	Dayton, Pioneer Standard	513-236-9900
OH	Dayton, Bell Inds	513-435-8660
OH	Reynoldsburg, Pioneer Standard	614-221-0043
OH	Solon, Hall-Mark Electrns	216-349-4632
OH	Worthington, Hall-Mark Electrns	614-888-3313
OK	Tulsa, Hall-Mark Electrns	918-254-6110
OK	Tulsa, Pioneer Standard	918-664-7840
OR	Beaverton, Future Electrns	503-645-9454
OR	Beaverton, Bell Inds	503-644-1500
PA	Horsham, Pioneer Standard	215-674-4000
PA	Pittsburgh, Pioneer Standard	412-782-2300
SC	Columbia, Dixie Elctrns	803-779-5332
TX	Austin, Hall-Mark Electrns	512-258-8848
TX	Austin, Pioneer Standard	512-835-40000
TX	Dallas, Hall-Mark Electrns	214-553-4300
TX	Dallas, Pioneer Standard	214-386-7300
TX	Dallas, Microchip Techngl Inc	214-733-0391
TX	Houston, Future Electrns	713-556-8696
TX	Houston, Hall-Mark Electrns	713-781-6100
TX	Houston, Pioneer Standard	713-495-4700
TX	Richardson, Future Electrns	214-437-2437
TX	San Antonio, Pioneer Standard	512-377-3440
UT	Midvale, Bell Inds	801-561-9691
UT	Salt Lake City, Fulture Electrns	801-972-8489
WA	Redmond, Future Electrns	206-881-8199
WA	Redmond, Bell Inds	206-867-5410
WA	Seattle, Hall-Mark Electrns	206-547-0415
WI	Brookfield, Pioneer Standard	414-784-3480
WI	New Berlin, Hall-Mark Electrns	414-797-7844
WI	Waukesha, Bell Inds	414-547-8879
Can	Alb., Calgary, Semad Elctrns	403-252-5664
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Can	Alberta, Calgary, Future Electrns	403-250-5550
Can	Alberta, Edmonton, Future Electrns	403-438-2858
Can	B.C., Burnaby, Semad Elctrns	604-420-9889
Can	British Columbia, Burnaby, ITT/Multicomponent	604-421-6222
Can	British Columbia, Vancouver, Future Electrns	604-294-1166
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Can	Manitoba, Winnipeg, ITT Multicomponents	204-697-2300
Can	Ont., Markham, Semad Elctrns	416-475-3922
Can	Ont., Mississauga, Future Electrns	416-612-9200
Can	Ont., Ottawa, Semad Elctrns	613-727-8325
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Can	Ontario, Nepean, ITT Multicomponets	613-596-6980
Can	Ontario, Ottawa, Future Electrns	613-820-8313
Can	Que., Pointe Claire, Future Elctrns	514-694-7710
Can	Que., Pointe Claire, Semad Elctrns	514-694-0860
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Intl	Austria, Wien, Bacher Elektronische Geraete	43-222-8135646
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Intl	Brazil, Sao Paulo, Aplicacoes Electrnas Artimar	55112310277
Intl	Denmark, Copenhagen, Exatec A/S	45-31191022
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Intl	France, Creteil Cedex, Mecodis	33-1-43-994400
Intl	France, Lissieu, Hymelec Composants	33-78476810
Intl	Germany, Kuessaberg, Semitron W. Roeck GmbH	49-7742-8001
Intl	Germany, Muenchen, Elctrn 2000 Vertriebs AG	089-45110-01
Intl	Germany, Unterhaching, Metronik GmbH	89-611080
Intl	Hong Kong, Kwai Fong, Maxisum Ltd	852-4180909
Intl	Israel, Tel Aviv, Elina Ltd.	912-3-498543

Intl	Italy, Assago-Milano, Intesi	39-2-8247-0215
Intl	Italy, Assago-Milano, Eurelettronica Spa	39-2-457-841
Intl	Italy, Milano, Kevin	39-2-4870-6300
Intl	Japan, Tokyo, Dainichi Comtronics Inc	3-3818-8081
Intl	Japan, Tokyo, Nippon Precision Device Corp	3-3260-1411
Intl	Japan, Toyko, Marubeni Hytech Co Ltd	81-3-817-4921
Intl	Korea, Seoul, Pro Chips Inc	02-849-8567
Intl	Netherlands, Nuenen, Semicon B.V.	31-40-837075
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Intl	So. Africa, Transvaal, Isando, Pace Electrns Comps	11-974-1211
Intl	Spain, Madrid, Sagitron	34-1416-9261
Intl	Sweden, Nacka, Memec Scandinavia AB	46-8-6434190
Intl	Switzerland, Wettingen, Omni Ray AG	41-1-56-275200
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Intl	Taiwan, Taipei, Solomon Technlg Corp	886-2-760-5858
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Intl	United Kingdom, Bolton, Lancashire, H.B. Electrns Ltd.	44-204-2-5544

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CA	Newport Beach, Jones & McGeoy Sales Inc.	714-727-8080
CA	San Diego, Jones & Mc Geoy Sales Inc.	619-458-5856
CA	San Jose, Bay Area Electrns Sales, Inc.	408-452-8133
CA	Woodland Hills, Jones & McGeoy Sales	818-715-7161
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FL	Orlando, Photon Sales, Inc	407-896-6064
GA	Norcross, Southeast Tech Group	404-416-6336
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IN	Indianapolis, Scott Electrns	317-841-0010
IA	Cedar Rapids, Advanced Tech Sales	319-393-8280
KS	Olathe, Advanced Teschnical Sales	913-782-8702
MD	Pasadena, Electrn Engnr & Sales	410-255-9686
MA	North Reading, Advanced Tech Sales	508-664-0888
MI	Farmington Hills, Rathsburg Assoc. Inc.	313-489-1500
MN	Bloomington, High Tech Sales	612-844-9933
MS	Meridian, Southeast Tech Group	601-485-7055
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NC	Zebulon, Southeast Tech Group	919-269-5589
OH	Cincinnati, Scott Electrns, Inc.	513-791-2513
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OH	Dayton, Scott Electrns, Inc.	513-294-0539
OH	Westerville, Scott Electrns, Inc.	614-882-6100
OK	Tulsa, Nova Mktg Inc	918-660-5105
OR	Portland, Westberg & Assocs	503-620-1931
PA	Trevose, Omega Electrn Sales Inc.	215-244-4000
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TX	Dallas, Nova Mktg Inc	214-265-4600
TX	Houston, Nova Mktg Inc	713-988-6082
UT	Salt Lake City, Wescom Mktg	801-269-0419
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AL	Huntsville, Wyle Laboratories	205-830-1119
AZ	Phoenix, Hall-Mark Electrns Corp.	602-437-1200
AZ	Phoenix, Wyle Laboratories	602-437-2088
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AZ	Tempe, Hamilton/Avnet Elctrns	602-961-1211
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CA	Chatsworth, Hall-Mark Electrns Corp.	818-773-4500
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CA	Culver City, Hamilton/Avnet Elctrns	213-327-3693
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CA	San Diego, Hamilton/Avnet Elctrns	619-571-1900
CA	San Jose, Anthem Electrns Inc.	408-453-1200
CA	San Jose, Hall-Mark Electrns Corp.	408-432-4000
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CA	Santa Clara, Wyle Laboratories	408-727-2500
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IN	Indianapolis, Hall-Mark Electrns	317-872-8875
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MA	Billerica, Hall-Mark Electrns	508-667-0902
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MI	Livonia, Hall-Mark Electrns	313-462-1205
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MN	Minnetonka, Hamilton/Avnet Elctrns	612-932-0600
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OR	Beaverton, Hamilton/Avnet Elctrns	503-526-6200
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TX	Houston, Hamilton/Avnet Elctrns	713-240-7733
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TX	Richardson, Wyle Laboratories	214-235-9953
UT	Salt Lake City, Anthem Electrns Inc	801-973-8555
UT	Salt Lake City, Wyle Laboratories	801-974-9953
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WI	Brookfield, Pioneer Standard	414-784-3480
WI	New Berlin, Hall-Mark Electrns	414-797-7844
WI	Waukesha, Hamilton/Avnet Elctrns	214-784-4510
WI	Waukesha, Wyle Laboratories	414-521-9333
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Intl	Belgium, Mechelen, Microtron	32-15-212223
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CA	San Jose, All American Semiconductor	408-943-1200
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NC	Raleigh, Godwin Assocs.	919-878-8000
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Intl	Japan, Tokyo, Nakano-Ku, Mosel-Vitelic (Worldwide Off)	81-3-3365-2851
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Intl	Korea, Seoul, Acetronix Co Ltd	82-2-796-4561
Intl	Korea, Seoul, Mosel-Vitelic (Worldwide Off)	82-2-553-3385
Intl	Singapore, Electec	65-294-8389
Intl	Singapore, Westech Elctrns PTE Ltd	65-743-6355
Intl	Spain, Madrid, ADM Electrna, S.A.	34-1-5304121
Intl	Sweden, Stockholm, Titan	46-08-644-7260
Intl	Sweden, Stockholm, DIP Elctrns	46-8-644-9190
Intl	Switzerland, Electronitel S.A.	41-374-10060
Intl	Switzerland, Baden Dattwill, Ascom Primotec Ag	41-56-840171
Intl	Taiwan, Hsinchu City, Mosel-Vitelic (Worldwide Off)	886-35-770055
Intl	Taiwan, Taipei, Mosel-Vitelic (Worldwide Off)	886-2-740-0829(30)
Intl	Taiwan, Taipei, Wisdom Technology Co Ltd	886-2-731-8496
Intl	Taiwan,Taipei, Veiga Technology Corp	886-2-933-2941

Distributors

AL	Huntsville, Hamilton Hallmark	205-837-8700
AL	Huntsville, Time Elctrns	205-721-1133
AL	Huntsville, Arrow Elctrns	205-837-6955
AZ	Phoenix, Hamilton Hallmark	602-437-1200
AZ	Scottsdale, A.V.E.D.	602-951-9788
AZ	Tempe, Time Elctrns	602-967-2000
AZ	Tempe, Arrow Elctrns	602-431-0030
CA	Anaheim, Time Elctrns	714-937-0911
CA	Calabasas, Arrow Elctrns	818-880-9686
CA	Camarillo, Milgray Elctrns	805-484-4055
CA	Chatsworth, Hamilton Hallmark	818-773-4500
CA	Chatsworth, Time Elctrns	818-998-7200
CA	Fountain Valley, Bell Microproducts	714-963-0667
CA	Irvine, Hamilton Hallmark	714-727-6000
CA	Irvine, Milgray Elctrns	714-753-1282
CA	Irvine, Arrow Elctrns	714-587-0404
CA	Milpitas, Bell Microproducts	408-434-1150
CA	Rocklin, Hamilton Hallmark	916-624-9781
CA	San Diego, A.V.E.D.	619-558-8890
CA	San Diego, Hamilton Hallmark	619-268-1201
CA	San Diego, Time Elctrns	619-586-1331
CA	San Diego, Arrow Elctrns	619-565-4800
CA	San Jose, Hamilton Hallmark	408-432-4000
CA	San Jose, Merit Elec.	408-434-0800
CA	San Jose, Arrow Elctrns	408-441-9700
CA	Sunnyvale, Time Elctrns	408-734-9888
CA	Torrance, Time Elctrns	213-320-0880
CA	Tustin, A.V.E.D.	714-259-8258
CA	Visialia, A.V.E.D.	209-734-8861
CO	Englewood, Hamilton Hallmark	303-790-1662
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CT	Arrow Elctrns	203-265-7741
CT	Cheshire, Hamilton Hallmark	203-271-2844

CT	Milford, Milgray Elctrns	203-878-5538
CT	Wallingford, Cronin Elctrns	203-265-3134
FL	Casselberry, Hamilton Hallmark	407-830-5855
FL	Deerfield Beach, Arrow Elctrns	305-429-8200
FL	Lake Mary, Arrow Elctrns	407-333-9300
FL	Largo, Hamilton Hallmark	813-541-7440
FL	Longwood, RM Elctrns	407-862-9191
FL	Orlando, Time Elctrns	407-841-6565
FL	Pompano Beach, Hamilton Hallmark	305-971-9280
FL	Winter Park, Milgray Elctrns	407-647-5747
GA	Duluth, Hamilton Hallmark	404-447-8000
GA	Duluth, Arrow Elctrns	404-497-1300
GA	Norcross, Milgray Elctrns	404-623-4400
GA	Norcross, Time Elctrns	404-448-4448
IL	Arlington Heights, Milgray Elctrns	708-253-1212
IL	Itasca, Arrow Elctrns	708-250-0500
IL	Schaumburg, Time Elctrns	708-303-3000
IL	Wood Dale, Hamilton Hallmark	312-860-3800
IN	Indianapolis, Hamilton Hallmark	317-872-8875
IN	Indianapolis, RM Elctrns	317-291-7110
IN	Indianapolis, Arrow Elctrns	317-299-2071
IA	Cedar Rapids, Arrow Elctrns	319-395-7230
KS	Lenexa, Hamilton Hallmark	913-888-4747
KS	Lenexa, Arrow Elctrns	913-541-9542
KS	Overland Park, Milgray Elctrns	913-236-8800
MD	Columbia, Time Elctrns	301-964-3090
MD	Columbia, Hamilton Hallmark	301-988-9800
MD	Columbia, Milgray Elctrns	301-621-8169
MD	Columbus, Arrow Elctrns	301-596-7800
MA	Billercia, Hamilton Hallmark	508-935-9777
MA	Needham, Cronin Elctrns	508-449-5000
MA	Peabody, Time Elctrns	508-532-6200
MA	Wilmington, Milgray Elctrns	508-657-5900
MA	Wilmington, Arrow Elctrns	508-658-0900
MA	Wilmington, Bell Microproducts	508-658-0222
MI	Grand Rapids, RM Elctrns	616-531-9300
MI	Livonia, Arrow Elctrns	313-462-2290
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MN	Bloomington, Hamilton Hallmark	612-881-2600
MN	Eden Prairie, Arrow Elctrns	612-941-5280
MO	Earth City, Hamilton Hallmark	314-291-5350
MO	St. Louis, Time Elctrns	314-391-6444
MO	St. Louis, Arrow Elctrns	314-567-6888
NH	Manchester, Cronin Elctrns	603-624-0105
NJ	Carlton, Milgray Elctrns	708-983-5010
NJ	Clifton, Vantage Comps, Inc	201-777-4100
NJ	Marlton, Time Elctrns	215-337-0900
NJ	Marlton, Arrow Elctrns	609-596-8000
NJ	Mt. Laurel, Hamilton Hallmark	609-235-1900
NJ	Parsippany, Hamilton Hallmark	201-515-3000
NJ	Parsippany, Milgray Electrns	201-335-1766
NJ	Pine Brook, Arrow Elctrns	201-227-7880
NY	East Syracuse, Cronin Elctrns	315-433-0033
NY	Fairport, Hamilton Hallmark	716-425-3300
NY	Farmingdale, Milgray Elctrns	516-391-3000
NY	Hauppauge, Arrow Elctrns	516-231-1000
NY	Hauppauge, Time Elctrns	516-273-0100
NY	Rochester, Arrow Elctrns	716-427-0300
NY	Ronkonkoma, Hamilton Hallmark	516-737-0600
NY	Smithtown, Vantage Comps, Inc	516-543-2000
NC	Raleigh, Hamilton Hallmark	919-872-0712
NC	Raleigh, Milgray Elctrns	919-790-8094
NC	Raleigh, Arrow Elctrns	919-876-3132
OH	Centerville, Arrow Elctrns	513-435-5563
OH	Cleveland, Milgray Elctrns	216-447-1520
OH	Solon, Hamilton Hallmark	216-349-4632
OH	Solon, Arrow Elctrns	216-248-3990
OH	Worthington, Hamilton Hallmark	614-888-3313
OK	Tulsa, Hamilton Hallmark	918-254-6110
OK	Tulsa, Arrow Elctrns	918-252-7537
OR	Beaverton, Arrow Elctrns	503-629-8090
OR	Portland, Time Elctrns	503-684-3780
PA	Pittsburgh, Arrow Elctrns	412-968-6807
TX	Austin, A.V.E.D.	512-454-8845
TX	Austin, Time Elctrns	512-339-3051
TX	Austin, Hamilton Hallmark	512-258-8848
TX	Austin, Arrow Elctrns	512-835-4180
TX	Carrollton, Time Elctrns	214-241-7441
TX	Carrollton, Arrow Elctrns	214-380-6464
TX	Dallas, A.V.E.D.	214-404-1144
TX	Dallas, Hamilton Hallmark	214-553-4300
TX	Dallas, Milgray Elctrns	214-248-1603
TX	Houston, Hamilton Hallmark	713-781-6100
TX	Houston, Arrow Elctrns	713-530-4700
TX	Stafford, Milgray Elctrns	713-240-5360
UT	Salt Lake City, Milgray Elctrns	801-272-4999
UT	Salt Lake City, Arrow Elctrns	801-973-6913
UT	West Valley, Time Elctrns	801-973-8181
UT	West Valley City, A.V.E.D.	801-975-9500
WA	Bellevue, Arrow Elctrns	206-643-9992
WA	Redmond, Time Elctrns	206-882-1600
WA	Seattle, Hamilton Hallmark	206-547-0415
WI	Brookfield, Arrow Elctrns	414-792-0150
WI	New Berlin, Hamilton Hallmark	414-797-7844
Can	Alberta, Arrow Elctrns	403-250-1690
Can	B. C., Vancouver, Future Elctrns	604-294-1166
Can	B.C., Arrow Elctrns	604-421-2333
Can	Ont., Ottawa, Future Elctrns	613-820-8313
Can	Ont., Ottawa, Time Elctrns	416-672-5300
Can	Ont., Toronto, Future Elctrns	416-638-4771
Can	Ont., Toronto, Milgray Elctrns	800-268-3315
Can	Ontario, Arrow Elctrns	416-670-7769
Can	Ontario, Arrow Elctrns	613-226-6903
Can	Que., Montreal, Future Elctrns	514-694-7710
Can	Que., Quebec City, Future Elctrns	418-682-8092
Can	Quebec, Arrow Elctrns	514-421-7411
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Intl	Australia, Sydney, Braemac Pty Ltd	61-2-564-1211
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Intl	Belguim, Alcom	03-458-3033
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Intl	Finland, Helsinki, Fintronic	35-806926022
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Intl	Germany, Munich, EPIC 2000	49-89422775
Intl	Germany, Munich, Tekelec Airtronic GmbH	49-8951640
Intl	Holland, Ijcapelle a/d Ijssel, Alcom	010-4519533
Intl	Hong Kong, Causeway Bay, Hennison Technlg Ltd	852-890-1967
Intl	Hong Kong, Kowloon, Tektron Elctrns Ltd	852-388-0629
Intl	Hong Kong, Kowloon Bay, Dynatek Elctrns Ltd	852-796-6689
Intl	Hong Kong, Taipo, NT, Mosel-Vitelic (Worldwide Off)	852-665-4883
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Intl	Japan, Kawasaki, Teksel Co Ltd	81-44-812-7430
Intl	Korea, Seoul, Inhwa Co Ltd	82-2-703-7231
Intl	Korea, Seoul, Acetronix Co Ltd	82-2-796-4561
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Intl	Singapore, Westech Elctrns PTE Ltd	65-743-6355
Intl	Spain, Madrid, ADM Electrna, S.A.	34-1-5304121
Intl	Sweden, Stockholm, Titan	46-08-644-7260
Intl	Sweden, Stockholm, DIP Elctrns	46-8-644-9190
Intl	Switzerland, Electronitel S.A.	41-374-10060
Intl	Switzerland, Baden Dattwill, Ascom Primotec AG	41-56-840171
Intl	Taiwan, Taipei, Veiga Technlg Corp	886-2-933-2341
Intl	Taiwan, Taipei, Wisdom Technlg Co Ltd	886-2-731-8496

MOTOROLA SEMICONDUCTOR

PRODUCTS, 5005 East McDowell Road, Phoenix,
Arizona 85008

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AZ	Tempe, Motorola	602-897-5056
CA	Agoura Hills, Motorola	818-706-1929
CA	Irvine, Motorola	714-753-7360
CA	Los Angeles, Motorola	310-417-8848
CA	Roseville, Motorola	916-922-7152
CA	San Diego, Motorola	619-541-2163
CA	Sunnyvale, Motorola	408-749-0510
CO	Colorado Springs, Motorola	719-599-7497
CO	Denver, Motorola	303-337-3434
CO	Grand Junction, Cheryl Lee Whitely(Full Line Rep)	303-243-9658
CT	Wallingford, Motorola	203-949-4100
FL	Clearwater, Motorola	813-538-7750
FL	Maitland, Motorola	407-628-2636
FL	Pompano Beach/Ft. Lauderdale, Motorola	305-486-9776
GA	Atlanta, Motorola	404-729-7100
ID	Boise, Motorola	208-323-9413
IL	Chicago/Hoffman Estates, Motorola	708-490-9500
IN	Ft. Wayne, Motorola	219-436-5818
IN	Indianapolis, Motorola	317-571-0400
IN	Kokomo, Motorola	317-457-6634
IA	Cedar Rapids, Motorola	319-373-1328
KS	Kansas City/Mission, Motorola	913-451-8555
KS	Wichita, Melinda Shores/Kelly Greiving(Full Line Rep)	316-838-0190
MD	Columbia, Motorola	410-381-1570
MA	Marlborough, Motorola	508-481-8100
MA	Woburn, Motorola	617-932-9700
MI	Detroit, Motorola	313-347-6800
MN	Minnetonka, Motorola	612-932-1500
MO	St. Louis, Motorola	314-275-7380
NV	Reno, Galena Tech. Grp. (Full Line Rep)	702-746-0642
NJ	Fairfield, Motorola	201-808-2400
NM	Albuquerque, S & S Technlgs Inc (Full Line Rep)	505-298-7177
NY	Fairport, Motorola	716-425-4000
NY	Hauppauge, Motorola	516-361-7000
NY	Poughkeepsie/Fishkill, Motorola	914-473-8102
NC	Raleigh, Motorola	919-870-4355
OH	Cleveland, Motorola	216-349-3100
OH	Columbus/Worthington, Motorola	614-431-8492
OH	Dayton, Motorola	513-495-6800
OK	Tulsa, Motorola	800-544-9496
OR	Portland, Motorola	503-641-3681
PA	Colmar, Motorola	215-997-1020
PA	Philadelphia/Horsham, Motorola	215-957-4100
TN	Knoxville, Motorola	615-690-5593
TX	Austin, Motorola	512-873-2000
TX	Houston, Motorola	800-343-2692
TX	Plano, Motorola	214-516-5100
UT	Salt Lake City, Utah Comps Sls (Full Line Rep)	801-561-5099
VA	Richmond, Motorola	804-285-2100
WA	Bellevue, Motorola	206-454-4160, 206-622-9960 (Seattle Access)
WA	Spokane, Doug Kenley(Full Line Rep)	509-924-2322
WI	Milwaukee/Brookfield, Motorola	414-792-0122
Can	B.C., Vancouver, Motorola	604-293-7605, 604-294-0619
Can	Ont., Ottawa, Motorola	613-226-3491
Can	Ont., Toronto, Motorola	416-497-8181
Can	Que., Montreal, Motorola	514-731-6881
Intl	Argentina, Buenos Aires, Argonics, S.A. (Full Line Rep.)	541-30-2461, 541-343-1787
Intl	Australia, Melbourne, Motorola	61-3-887-0711
Intl	Australia, Sydney, Motorola	61-2-906-3855
Intl	Brazil, Sao Paulo, Motorola	55-11-815-4200
Intl	China, Beijing, Motorola	86-505-2180
Intl	Finland, Helsinki, Motorola	358-0-351-61191
Intl	France, Paris, Motorola	33-1-40-955-900
Intl	Germany, Langenhagen/Hannover, Motorola	49-511-789911
Intl	Germany, Munich, Motorola	49-89-92103-0
Intl	Germany, Nurenberg, Motorola	49-911-64-3044
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Intl	Germany, Wiesbaden, Motorola	49-611-761921
Intl	Hong Kong, Kwai Fong, Motorola	852-4808333
Intl	Hong Kong, Tai Po, Motorola	852-6668333
Intl	India, Bangalore, Motorola	91-812-627094
Intl	Israel, Tel Aviv, Motorola	972-3-753-8222
Intl	Italy, Milan, Motorola	39-2-82201
Intl	Japan, Aizu, Motorola	81-241-272231
Intl	Japan, Atsugi, Motorola	81-0462-23-0761
Intl	Japan, Kumagaya, Motorola	81-0485-26-2600
Intl	Japan, Kyushu, Motorola	81-092-771-4212
Intl	Japan, Mito, Motorola	81-0292-26-2340
Intl	Japan, Nagoya, Motorola	81-052-232-1621
Intl	Japan, Osaka, Motorola	81-06-305-1801
Intl	Japan, Sendai, Motorola	81-22-268-4333
Intl	Japan, Tachikawa, Motorola	81-0425-23-6700
Intl	Japan, Tokyo, Motorola	81-03-3440-3311
Intl	Japan, Yokohama, Motorola	81-045-472-2751
Intl	Korea, Pusan, Motorola	82-51-4635-035
Intl	Korea, Seoul, Motorola	82-2-554-5118
Intl	Malaysia, Penang, Motorola	60-4-374514
Intl	Mexico, Gaudalajara, Motorola	52-36-21-8977
Intl	Mexico, Mexico City, Motorola	52-5-282-2864, 52-5-282-0495
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Intl	Singapore, Motorola	65-2945438
Intl	Spain, Madrid, Motorola	34-1-457-8204/8254

Intl	Sweden, Solna, Motorola	46-8-734-8800
Intl	Switzerland, Geneva, Motorola	41-22-799-11-11
Intl	Switzerland, Zurich, Motorola	41-1-730-4074
Intl	Taiwan, Taipei, Motorola	886-2-717-7089
Intl	Thailand, Bangkok, Motorola	66-2-254-4910
Intl	United Kingdom, Aylesbury, Motorola	44-296-395-252
PR	Puerto Rico, San Juan, Motorola	809-793-2170

Distributors

AL	Huntsville, Hall-Mark Elctrns	205-837-8700
AL	Huntsville, Arrow/Schweber Elctrns	205-837-6955
AL	Huntsville, Time Elctrns	205-721-1133
AL	Huntsville, Future Elctrns	205-830-2322
AL	Huntsville, Newark Elctrns	205-837-9091
AZ	Chandler, Hamilton/Avnet Elctrns	602-961-0836
AZ	Phoenix, Hall-Mark Elctrns	602-437-1200
AZ	Phoenix, Wyle Labs	602-437-2088
AZ	Phoenix, Future Elctrns	602-968-7140
AZ	Phoenix, Newark Elctrns	602-864-9905
AZ	Tempe, Arrow/Schweber Elctrns	602-431-0030
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CA	Agoura Hills, Time Elctrns	818-707-2890
CA	Belmont, Richardson Elctrns	415-592-9225
CA	Calabasas, Arrow/Schweber Elctrns	818-880-9686
CA	Calabasas, Wyle Labs	818-880-9000
CA	Chatsworth, Future Elctrns	818-772-6240
CA	Chatsworth, Hall-Mark Elctrns	818-773-4500
CA	Chatsworth, Time Elctrns	818-998-7200
CA	Costa Mesa, Hamilton/Avnet Elctrns	714-754-6092
CA	Culver City, Hamilton/Avnet Corporate	213-558-2000
CA	Gardena, Hamilton/Avnet Elctrns	213-516-6498
CA	Irvine, Wyle Labs Corporate	714-753-9953
CA	Irvine, Hall-Mark Elctrns	714-727-6000
CA	Irvine, Arrow/Schweber Elctrns	714-587-0404
CA	Irvine, Wyle Labs	714-863-9953
CA	Irvine, Future Elctrns	714-250-4141
CA	Mt. View, Richardson Elctrns	415-960-6900
CA	Orange, Newark	714-634-8224
CA	Rocklin, Hall-Mark Elctrns	916-624-9781
CA	Sacramento, Wyle Labs	916-638-5282
CA	Sacramento, Hamilton/Avnet Elctrns	916-925-2216
CA	Sacramento, Newark	916-721-1633
CA	San Diego, Arrow/Schweber Elctrns	619-565-4800
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CA	San Diego, Hamilton/Avnet Elctrns	619-571-8730
CA	San Diego, Wyle Labs	619-565-9171
CA	San Diego, Future Elctrns	619-278-5020
CA	San Diego, Newark	619-569-9877
CA	San Francisco, Newark	415-571-5300
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CA	San Jose, Arrow/Schweber Elctrns	408-441-9700, 408-428-6400
CA	San Jose, Future Elctrns	408-434-1122
CA	Santa Clara, Wyle Labs	408-727-2500
CA	Sunnyvale, Hamilton/Avnet Elctrns	408-743-3300
CA	Sunnyvale, Time Elctrns	408-734-9888
CA	Tornace, Time Elctrns	310-320-0880
CA	Tustin, Time Elctrns	714-669-0100
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CA	Woodland Hills, Hamilton/Avnet Elctrns	818-594-0404
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CO	Denver, Newark	303-757-3351
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CO	Englewood, Arrow/Schweber Elctrns	303-799-0258
CO	Englewood, Time Elctrns	303-721-8882
CO	Englewood, Hamilton/Avnet Elctrns	303-740-1000
CO	Thornton, Wyle Labs	303-457-9953
CT	Bethel, Future Elctrns	203-743-9594
CT	Cheshire, Hall-Mark Elctrns	203-271-2844
CT	Danbury, Hamilton/Avnet Elctrns	203-743-6077
CT	Southbury, Time Elctrns	203-271-3200
CT	Wallingford, Arrow/Schweber Elctrns	203-265-7741
CT	Windsor, Newark	203-683-8860
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FL	Orlando, Hamilton/Avnet Elctrns	407-628-3888
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GA	Norcross, Future Elctrns	404-441-7676
GA	Norcross, Newark	404-448-1300
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IL	Chicago, Newark Elctrns Corp	312-784-5100
IL	Hoffman Estates, Future Elctrns	708-882-1255
IL	Itasca, Arrow/Schweber Elctrns	708-250-0500
IL	La Fox, Richardson Elctrns	708-208-2401
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IL	Schaumburg, Newark	708-310-8980
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IN	Fort Wayne, Newark	219-484-0766
IN	Indianapolis, Arrow/Schweber Elctrns	317-299-2071
IN	Indianapolis, Time Elctrns	708-303-3000
IN	Indianapolis, Hamilton/Avnet Elctrns	317-844-9333
IN	Indianapolis, Newark	317-259-0085
IN	Indianapolis, Hall-Mark Elctrns	317-872-8875
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IA	Cedar Rapids, Newark	319-393-3800
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NM	Albuquerque, Alliance Elctrns	505-292-3360
NM	Albuquerque, Bell Inds	505-292-2700
NM	Albuquerque, Hamilton/Avnet Elctrns	505-345-0001
NY	Binghampton, Pioneer	607-722-9300
NY	Buffalo, Summit Elctrns	716-887-2800
NY	Commack, Anthem Elctrns	516-864-6600
NY	Fairport, Pioneer Standard	716-381-7070
NY	Hauppauge, Hamilton/Avnet Elctrns	516-231-9444
NY	Hauppauge, Time Elctrns	516-273-0100
NY	North Syracuse, Hamilton/Avnet Elctrns	315-437-2641
NY	Port Chester, Zeus Comps Inc	914-937-7400
NY	Rochester, Hamilton/Avnet Elctrns	716-292-0730
NY	Rochester, Summit Elctrns	716-334-8110
NY	Ronkonkoma, Zeus Comps Inc.	516-737-4500
NY	Syracuse, Time Elctrns	315-432-0355
NY	Westbury, Hamilton/Avnet Export Div	516-997-6868
NY	Woodbury, Pioneer Elctrns	516-921-8700
NC	Charlotte, Hamilton/Avnet Elctrns	704-527-2485
NC	Charlotte, Pioneer Technlg	704-527-8188
NC	Durham, Pioneer Technlg	919-544-5400
NC	Morrisville, Pioneer Technlg	919-460-1530
NC	Raleigh, Hamilton/Avnet Elctrns	919-878-0810
OH	Cleveland, Pioneer Standard	216-587-3600
OH	Columbus, Time Elctrns	614-794-3301
OH	Dayton, Bell Inds	513-435-8660
OH	Dayton, Hamilton/Avnet Elctrns	513-439-6700
OH	Dayton, Pioneer Standard	513-236-9900
OH	Dayton, Bell Inds-Military	513-434-8231
OH	Dayton, Zeus Comps Inc	513-293-6162
OH	Independence, Hamilton/Avnet Elctrns	216-349-5100
OK	Tulsa, Hamilton/Avnet Elctrns	918-664-0444
OK	Tulsa, Pioneer Standard	918-665-7840
OK	Tulsa, Radio Inc	918-587-9123
OR	Beaverton, Anthem Elctrns	503-643-1114
OR	Beaverton, Bell Inds	503-644-3444
OR	Beaverton, Hamilton/Avnet Elctrns	800-332-8638
OR	Portland, Time Elctrns	503-684-3780
PA	Horsham, Pioneer Technlg	215-674-4000
PA	Horsham, Anthem Elctrns	215-443-5150
PA	Mars, Hamilton/Avnet Elctrns	412-281-4150
PA	Pittsburgh, Pioneer Standard	412-782-2300
TX	Austin, Time Elctrns	512-346-7346
TX	Austin, Pioneer Standard	512-835-4000
TX	Austin, Hamilton/Avnet Elctrns	512-837-8911
TX	Austin, Minco Technlg Labs	512-834-2022
TX	Dallas, Pioneer Standards	214-386-7300
TX	Dallas, Hamilton/Avnet Elctrns	214-308-8111
TX	Houston, Pioneer Standard	713-495-4700
TX	Houston, Hamilton/Avnet Elctrns	713-240-7733
TX	Richardson, Time Elctrns	214-644-4644
TX	Richardson, Zeus Comps Inc	214-783-7010
TX	Richardson, Anthem Elctrns	214-238-7100
UT	Midvale, Bell Inds	801-255-9611
UT	Salt Lake City, Anthem Elctrns	801-973-8555
UT	Salt Lake City, Hamilton/Avnet Elctrns	801-972-2800
UT	West Valley, Time Elctrns	801-973-8494
WA	Bothell, Anthem Elctrns	206-483-1700
WA	Kirkland, Time Elctrns	206-820-1525
WA	Redmond, Bell Inds	206-867-5410
WA	Redmond, Hamilton/Avnet Elctrns	801-266-2022
WI	Brookfield, Pioneer Elctrns	414-784-3480
WI	Mequon, Taylor Elec	414-241-4321
WI	Waukesha, Bell Inds	414-547-8879
WI	Waukesha, Hamilton/Avnet Elctrns	414-784-8205
Can	Alb., Calgary, Electro Sonic	403-255-9550
Can	Alb., Calgary, Zentronics	403-295-8838
Can	Alb., Calgary, Semad Elctrns Ltd	403-252-5664
Can	Alb., Edmonton, Zentronics	403-482-3038
Can	B. C., Burnaby, Semad Elctrns Ltd	604-420-9889
Can	B. C., Burnaby, Hamilton/Avnet Elctrns	604-420-4101
Can	B. C., Richmond, Electro Sonic Inc	604-273-2911
Can	B. C., Richmond, Zentronics	604-273-5575
Can	Manitoba, Winnipeg, Electro Sonic Inc	204-783-3105
Can	Manitoba, Winnipeg, Zentronics	204-694-1957
Can	Ont., Markham, Semad Elctrns Ltd	416-475-3922
Can	Ont., Mississauga, Hamilton/Avnet Elctrns, Ltd	416-795-3825
Can	Ont., Mississauga, Zentronics	416-507-2600
Can	Ont., Mississauga, Time Elctrns	416-672-5300
Can	Ont., Nepean, Hamilton/Avnet Elctrns	613-226-1700
Can	Ont., Nepean, Zentronics	613-226-8840
Can	Ont., Ottawa, Electro Sonic Inc	613-728-8333
Can	Ont., Ottawa, Semad Elctrns., Ltd	613-727-8325
Can	Ont., Willowdale, Electro Sonic Inc	416-494-1666
Can	Que., Pointe Claire, Semad Elctrn Ltd	514-694-0860
Can	Que., St. Laurent, Zentronics	514-737-9700
Can	Que., St. Laurent, Hamilton/Avnet Elctrns	514-335-1000

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TELEX: 172932, TWX: NCMCORP, FAX: 408-496-0388

NU HORIZONS
NU HORIZONS ELECTRONICS CORP.
NY (516) 226-6000
CT (203) 265-0162
NJ (201) 882-8300
MA (617) 246-4442
No. NY (716) 292-0777
MD (410) 995-6330
PA (609) 231-0900
OH (216) 349-2008
FL (305) 735-2555
No. Fl (407) 831-8008
GA (404) 416-8666
AL (205) 722-9330
INT'L (201) 882-4290
NCR MICROELECTRONIC PRODUCTS

NCR CORPORATION, Microelectronic Products
Division, 2001 Danfield Court, Fort Collins, Colorado
80525, Tel: 303-226-9500, FAX: 303-226-9556

Sales Office & Representatives

AL	Huntsville, Electrn Mfgs' Agents	205-830-4030
AZ	Phoenix, Sun State Tech, Inc.	602-220-0595
CA	Gardena, Ellen & Co, Inc	310-366-1314
CA	Los Angeles, NCR-Southwest Sls	213-643-4466
CA	Newport Beach, NCR-Southwest Sls	714-474-7095
CA	Newport Beach, Leading Concepts	714-851-0654
CA	San Diego, Earle Assocs., Inc.	619-278-5441
CA	San Jose, NCR-Northwest Sls	408-441-1080
CA	Santa Clara, Phase II Tech Sls	408-980-0414
CO	Aurora, Electrodyne Inc.	303-695-8903
CO	Colorado Springs, NCR Microelec. Prod. Div.	719-596-5795
CO	Ft. Collins, NCR Microelec. Prod. Div.	303-226-9500
CT	Southbury, Dynamic Technlgs	203-262-6220
FL	Melbourne, Photon Sls Inc	407-259-8999
FL	Orlando, Photon Sls Inc	407-896-6064
FL	Seffner, Photon Sls Inc	813-689-6751
GA	Alpharetta, NCR-Southeast Sls	404-740-9151
GA	Roswell, Electrn Mfgs' Agents	404-992-7240
IL	Barrington, Omni Elctrns Mktg	708-381-9087
IN	Carmel, Bailey's Elctrns Sls & Tech., Inc.	317-848-9958
IA	Cedar Rapids, Dy-Tronix, Inc.	319-377-8275
KS	Leawood, Dy-Tronix, Inc.	913-339-6333
KS	Wichita, Dy-Tronix, Inc.	316-838-0884
MA	Tewksbury, ProComp Assocs., Inc	508-858-0100
MA	Woburn, NCR-Northeast Sls	617-933-0778
MI	Farmington Hills, Rathsburg Assocs., Inc.	313-489-1500
MN	Bloomington, NCR-North Central Sls	612-941-7075
MN	Eden Prairie, Aldridge Assoc.	612-944-8433
MO	Bridgeton, Dy-Tronix, Inc.	314-291-4777
NM	Albuquerque, Nelco Electronix	505-293-1399
NY	E. Rochester, Ontec Elctrn Mktg.	716-383-4450
NY	Ronkonkoma, Comtronic Assocs., Inc.	516-737-2400
NY	Syracuse, Ontec Elctrn Mktg	315-492-1700

NY	Wappinger Falls, Ontec Elctrn Mktg.	914-462-7374
OH	Independence, Rathsburg Assocs., Inc	216-447-8825
PA	West Chester, TCA, Inc	215-692-6853
TX	Arlington, ION Assocs., Inc.	817-695-8000
TX	Austin, ION Assocs., Inc.	512-794-9006
TX	Dallas, NCR-South Central Sls	214-733-3594
TX	Houston, ION Assocs., Inc.	713-537-7717
Can	Ont., Concord, Har Tech Elctrns Ltd	416-660-3419
Can	Ontario, Har-Tech Elctrns., Ltd.	613-726-9410
Can	Que., Pointe Claire, Har-Tech Elctrns., Ltd.	514-694-6110
Intl	Australia, Braemac Pty. Ltd.	011-61-2-564-1211
Intl	Central Hong Kong, NCR Sls Office	011-852-859-6044
Intl	Germany, Muenchen, NCR Microelec. Prods. Div.	49-89-57931-199
Intl	Germany, Taunusstein-Hahn, Manhattan Skyline Halbleiter	011-49-61-282-3044
Intl	Hong Kong, Asia/Pacific Sales Hdqtrs.	852-859-6044
Intl	Hong Kong, Kowloon, RTI Inds Co Ltd	011-852-795-7421
Intl	Japan, Yokohama, Macnica	011-81-45-939-6140
Intl	Norway, Oppegard, Eurodata	011-47-2-992050
Intl	Singapore, NCR Singapore	011-65-322-7243
Intl	Taiwan (ROC) Taipei, Prospect Technology Corp.	011-886-2-820-5353
Intl	Taiwan, Hsinchu, Winbond Elctrns Corp	011-886-35-770066
Intl	Taiwan, Taipei, NCR Microelec. Prods. Div	011-886-2-7191415

Distributors

AZ	Tempe, Insight Elctrns	800-677-7716
AZ	Tempe, Anthem Elctrns	602-966-6600
CA	Brain Hill, Insight Elctrns	408-720-9222
CA	Chatsworth, Anthem Elctrns	818-775-0422
CA	Irvine, Insight Elctrns	714-727-3291
CA	Irvine, Anthem Elctrns	714-380-4759
CA	Rocklin, Anthem Elctrns	916-624-9744
CA	San Diego, Insight Elctrns	619-587-1100
CA	San Diego, Anthem Elctrns	619-453-9005
CA	San Jose, Anthem Elctrncs	408-453-1200
CA	San Jose, Pioneer Technologies	408-954-9100
CA	Westlake Village, Insight Elctrns	818-707-2101
CO	Colorado Springs, Anthem Elctrns	719-597-4205
CO	Englewood, Anthem Elctrns	303-790-4500
CO	Englewood, Insight Elctrns	800-688-7718
CT	Shelton, Pioneer Standard	203-929-5600
CT	Waterbury, Anthem Elctrns	203-575-1575
FL	Alamonte Springs, Pioneer Technlgs	407-834-9090
FL	Clearwater, Pioneer Technlgs	813-536-0445
FL	Deerfield Beach, Pioneer Technlgs	305-428-8877
GA	Duluth, Pioneer Technlgs	404-623-1003
IL	Addison, Pioneer Standard	708-495-9680
IL	Palatine, Ohm Elctrns	708-359-5500
IL	Schaumburg, Anthem Elctrns	708-884-0200
IN	Indianapolis, Pioneer Standard	317-573-0880
MD	Columbia, Anthem Elctrns	410-995-6640
MD	Gaithersburg, Pioneer Technlgs	301-921-0660
MA	Lexington, Pioneer Standard	617-861-9200
MA	Wilmington, Anthem Elctrns	508-657-5170
MI	Grand Rapids, Pioneer Standard	616-698-1800
MI	Livonia, Pioneer Standard	313-525-1800
MN	Eden Prairie, Pioneer Standard	612-944-3355
MN	Eden Prairie, Anthem Elctrns	612-944-5454
NJ	Fairfield, Pioneer Standard	201-575-3510
NJ	Pinebrook, Anthem Elctrns	201-227-7960
NY	Binghampton, Pioneer Standard	607-722-9300
NY	Commack, Anthem Elctrns	516-864-6600
NY	Fairport, Pioneer Technlgs	716-381-7070
NY	Melville, Arrow Elctrns	516-391-1769
NY	Woodbury, Pioneer Standard	516-921-8700
OH	Beaverton, Insight Elctrns	503-644-3300
OH	Cleveland, Pioneer Standard	216-498-6534, 216-498-6968
OH	Dayton, Pioneer Standard	513-236-9900
OH	Reynoldsburg, Pioneer Standard	614-221-0043
OR	Beaverton, Anthem Elctrns	503-643-1114, 1-800-247-7720
PA	Horsham, Anthem Elctrns	215-443-5150
PA	Horsham, Pioneer Technlgs	215-674-4000
PA	Pittsburgh, Pioneer Standard	412-782-2300
TX	Austin, Pioneer Standard	512-835-4000
TX	Dallas, Pioneer Standard	214-419-5511
TX	Houston, Pioneer Standard	713-495-4700
TX	Richardson, Anthem Elctrns	214-238-7100
TX	San Antonio, Pioneer Standard	512-377-3440
UT	Salt Lake City, Anthem Elctrns	801-973-8555
WA	Bothell, Anthem Elctrns	206-483-1700
WA	Kirkland, Insight Elctrns	206-820-8100
WI	Brookfield, Pioneer Standard	414-784-3480
Intl	Australia, Leichhardt N.S.W., Braemac Pty Ltd	011-61-2-564-1211
Intl	Brazil, Sao Paulo, NCR Brazil	55-11-279-0522
Intl	Denmark, Kobenhavn, Exatec A/S	011-45-31-19-1022
Intl	Denmark, Silkeborg, Micronor	011-45-86-816522
Intl	Finland, Helsinki, Integrated Elctrns	011-358-0-351-3133
Intl	France, Cedex, Tekelec Airtronic	011-331-46-232425
Intl	Germany, Martinsreid, Atlantik Electrn GmbH	011-49-89-857-0000
Intl	Germany, Munchen, NCR MPD OEM Europe E2000	011-49-89-57931-199
Intl	Germany, Taunusstein-Hahn, Manhattan Skyline Halbeite	49-6128-23044
Intl	Israel, Tel Aviv, Israel Intl Purch I.E. Mittwoch & Sons, Ltd.	011-972-3-209511
Intl	Italy, Milano, Skylab	011-39-2-667-10-822
Intl	Japan, Yokohama, Macnica	011-81-45-939-6140
Intl	Korea, Seoul, Ellen & Co	011-82-5793330
Intl	Netherlands, Zoetermeer, Akam Elctrns	011-31-79-443200
Intl	Norway, Oppegard, Eurodata	011-47-2-992050
Intl	Sweden, Bromma, IE Komponenter	011-46-8-804685
Intl	Taiwan, Hsinchu, Windbond Elctrns	011-886-35-770066
Intl	Taiwan, Taipei, Wintek Elctrns	011-886-2-713-0209
Intl	United Kingdom, Berkshire, Manhattan Skyline, Ltd.	44-628-75851

NEC ELECTRONICS INC., 475 Ellis Street,
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TELEX: 3715792, FAX: 1-800-729-9288

Sales Office & Representatives

AL	Huntsville, 20th Century Mktg.	205-772-9999
AZ	Phoenix, Oasis Sales, Inc	602-277-2714
CA	Encino, NEC Electrns (Western)	818-342-3112
CA	Mountain View, ASIC Design Center	415-965-6142
CA	Mountain View, NEC Electrns (Northern Calif)	415-965-6200
CA	San Jose, Mission Technology	619-674-6191
CA	San Jose, Exis	408-456-1650
CA	Santa Ana, ASIC Design Centers	714-546-0501
CA	Santa Ana, NEC Electrns (Western)	714-546-0501
CA	Santa Clara, NEC Elctrns (Northern CA)	408-986-1020
CO	Aurora, NEC Electrns (Western)	303-755-6353
CO	Englewood, Compass Mktg. & Sls. Inc.	303-721-9663
CO	Thornton, Marshall Inds	303-451-8383
CT	Cheshire, Datatrack Engnr, Inc.	203-271-1311
FL	Altamonte Springs, V.G. Sales Co. Inc.	407-831-8688
FL	Cooper City, NEC Electrns (Eastern)	305-436-8114
FL	Ft. Lauderdale, V.G.Sales Co. Inc.	305-938-4333
FL	Largo, V.G. Sales Co. Inc.	813-536-7787
FL	Maitland, NEC Electonics (Eastern)	407-875-1145
GA	Norcross, 20th Century Mktg Inc.	404-446-1999
GA	Norcross, NEC Electrns (Eastern)	404-447-4409
IL	Hoffman Estates, ASIC Design Center	708-519-3930
IL	Hoffman Estates, NEC Electrns (Central)	708-519-3930
IL	Schaumburg, Martan Inc.	708-303-5660
IN	Carmel, Technology Mktg Corp.	317-844-8462
IN	Ft. Wayne, Technology Mktg Corp.	219-432-5553
IN	Kokomo, Technology Mktg. Corp.	317-459-5152
IA	Cedar Rapids, Stan Clothier Co.	319-393-1576
KS	Overland Park, AME Sales	913-492-3971
KY	Louisville, TMC	502-245-7411
MD	Glen Burnie, TRI-MARK Inc.	301-761-6000
MA	Natick, ASIC Design Center	508-655-8833
MA	Natick, NEC Electrns (Eastern)	508-650-4100
MA	Woburn, Compass Technology	617-933-3336
MI	Kentwood, Miltimore Sales	616-554-9292
MI	Novi, Miltimore Sales	313-349-0260
MI	Troy, NEC Electrns (Central)	313-680-0506
MN	Eden Prairie, Stan Clothier Company	612-944-3456
MN	Minneapolis, NEC Electrns (Central)	612-844-0209
MO	St. Charles, AME Sales	314-928-2599
NJ	Fairfield, Metro Logic Corp.	201-575-5585
NJ	Moorestown, TAI Corp.	609-778-5353
NJ	Somerset, NEC Electrns (Eastern)	908-469-5005
NY	Bohemia, Edge Elctrns, Inc	516-567-6300
NY	Fairport, NEC Electrns (Eastern)	716-425-4590
NY	Fishkill, NEC Electrns (Eastern)	914-897-2101
NY	Melville, NEC-Eastern Region	516-753-7526
NY	Pittsford, Elcom Sales	716-385-1400
NY	Skaneateles, Elcom Sales	315-685-8245
NC	Cary, NEC Electrns (Eastern)	919-460-1890
NC	Charlotte, Quantum Mktg Inc.	704-523-8822
NC	Durham, ASIC Design Center	919-544-4132
NC	Raleigh, Quantum Mktg Inc.	919-846-5728
OH	Cincinnati, TMC of Ohio	513-271-3860
OH	Columbus, NEC Electrns (Central)	614-436-1778
OH	Middleburg Hgts., TMC of Ohio	216-885-5544
OH	Pepper Pike, NEC Electrns (Central)	216-831-0067
OR	Portland, Venture Electrns	503-624-0617
OR	Tigard, NEC-Electrns (Western)	503-671-0177
OR	Tigard, ASIC Design Center	503-671-0177
PA	Allentown, NEC Electrns (Eastern)	215-391-9094
PA	Trevose, NEC Electrns (Eastern)	215-244-8196
TN	Knoxville, 20th Century Mktg, Inc.	615-539-0887
TX	Austin, TL Mktg, Inc.	512-837-7272
TX	Dallas, ASIC Design Center	214-250-4522
TX	Dallas, TL Mktg, Inc.	214-490-9300
TX	Dallas, NEC Electrns (Central)	214-931-0641
TX	Houston, NEC Electrns (Central)	713-320-0524
TX	Houston, TL Mktg, Inc.	713-587-8100
TX	Leander, NEC-Midwest	512-259-4947
UT	Salt Lake City, Compass Mktg. & Sls Inc.	801-322-0391
WA	Bellevue, Venture Electrns	206-454-4594
WI	Mequon, Martan Inc.	414-241-4955
Can	Alb., Calgary, Kaytronics	403-275-7000
Can	B. C., Burnaby, Kaytronics	604-294-2000
Can	Ont., Kanata, Kaytronics	613-592-6606
Can	Ont., Mississauga, Kaytronics	416-507-6400
Can	Que., Ville St-Laurent, Kaytronics	514-745-5800
PR	Mayaguez, V.G. Sales Co. Inc.	809-831-4050

Distributors

AL	Huntsville, Marshall Inds	205-881-9235
AL	Huntsville, Reptron Elctrns	205-722-9500, 800-659-5056
AZ	Phoenix, Marshall Inds.	602-496-0290
AZ	Phoenix, Sterling Elctrns	602-437-5565
CA	Agoura Hills, Western Microtechnlg	818-707-0731
CA	Calabasas, Marshall Inds.	818-878-7000
CA	Camarillo, Milgray Elctrns	805-484-4055, 800-635-7812
CA	Chatsworth, Sterling Elctrns	818-407-8850
CA	El Monte, Marshall Inds.	818-307-6000
CA	Fountain Valley, Bell Microproducts	714-963-0667
CA	Irvine, Milgray Elctrns	714-753-1282, 800-468-9277
CA	Irvine, Marshall Inds.	714-859-5050
CA	Milpitas, Marshall Inds.	408-942-4600
CA	Orange, Western Microtechnlg	714-637-0200
CA	Rancho Cordova, Marshall Inds.	916-635-9700
CA	San Diego, Sterling Elctrns	619-560-8097
CA	San Diego, Marshall Inds.	619-627-4184
CA	San Diego, Western Microtechnlg	619-453-8430
CA	San Jose, Bell Microproducts	408-451-9400
CA	San Jose, Sterling Elctrns	408-435-0835
CA	San Jose, Merit Elctrns	408-434-0800
CA	San Jose, Milgray Elctrns	408-456-0900, 800-442-0946
CA	Saratoga, Western Microtechnlg	408-725-1660
CA	Tustin, Sterling Elctrns	714-259-0900
CA	Westgate Village, Bell Microproducts	805-496-2606
CO	Englewood, Sterling Elctrns	303-792-3939
CT	Milford, Milgray Elctrns	203-878-5538, 800-922-6911
CT	Wallingford, Marshall Inds.	203-265-3822
CT	Wallingford, Sterling Elctrns	1-800-800-9535, 203-265-9535
FL	Altamonte Springs, Marshall Inds.	407-767-8585
FL	Ft. Lauderdale, Marshall Inds.	305-977-4880

FL	Ft. Lauderdale, Reptron Elctrns	305-735-1112
FL	Lake Mary, Milgray Elctrns	407-321-2555, 800-367-0780
FL	St. Petersburg, Marshall Inds.	813-573-1399
FL	Tampa, Reptron Elctrns	813-854-2351, 800-659-1361
GA	Norcross, Marshall Inds.	404-923-5750
GA	Norcross, Milgray Elctrns	404-446-9777
GA	Norcross, Reptron Elctrns	404-446-1300
IL	Palatine, Milgray Elctrns	708-202-1900, 800-322-6271
IL	Schaumburg, Marshall Inds.	708-490-0155
IL	Schaumburg, Sterling Elctrns	708-303-9900
IL	Schaumburg, Reptron Elctrns	708-882-1700, 800-659-3595
IN	Indianapolis, Marshall Inds.	317-297-0483
KS	Lenexa, Marshall Inds.	913-492-3121
KS	Lenexa, Sterling Elctrns	913-492-5406
KS	Overland Park, Milgray Elctrns	913-236-8800, 800-255-6576
MD	Columbia, Milgray Elctrns	301-995-6169, 800-638-6656
MD	Columbia, Sterling Elctrns	301-290-3800
MD	Columbia, Vantage Comps	301-720-5100
MD	Silver Spring, Marshall Inds	301-622-1118
MA	Burlington, Western Microtechnlg	617-273-2800
MA	Hopkinton, Interface Elctrns	508-435-0100
MA	Wilmington, Bell Microproducts	508-658-0222
MA	Wilmington, Marshall Inds	508-658-0810
MA	Wilmington, Milgray Elctrns	508-657-5900, 800-334-6941
MA	Woburn, Sterling Elctrns	617-938-6200
MI	Livonia, Marshall Inds	313-525-5850
MI	Livonia, Reptron Elctrns	313-525-2700, 800-659-3844
MN	Minneapolis, Sterling Elctrns	612-831-2666
MN	Minnetonka, Reptron Elctrns	612-938-0000, 800-659-4990
MN	Plymouth, Marshall Inds	612-559-2211
MO	Bridgeton, Marshall Inds	314-291-4650, 800-227-2894
NJ	Clifton, Vantage Comps	201-777-4100
NJ	Edison, Sterling Elctrns	908-417-1000
NJ	Fairfield, Marshall Inds	201-882-0320
NJ	Marlton, Milgray Elctrns	609-983-5010, 800-257-7111
NJ	Marlton, Interface Elctrns	609-988-5448
NJ	Marlton, Western Microtechnlg	609-596-7775
NJ	Mt. Laurel, Marshall Inds	609-234-9100
NJ	Parsippany, Milgray Elctrns	201-335-1766, 800-622-0291
NM	Albuquerque, Sterling Elctrns	505-884-1900
NY	Endicott, Marshall Inds.	800-678-0010
NY	Farmingdale, Milgray Elctrns	516-420-9800
NY	Pittsford, Milgray Elctrns	716-381-9700
NY	Rochester, Marshall Inds.	716-235-7620
NY	Smithtown, Vantage Comps	516-543-2000
NC	Raleigh, Marshall Inds.	919-878-9882
NC	Raleigh, Milgray Elctrns	919-790-8094, 800-562-3118
NC	Raleigh, Reptron Elctrns	919-870-5189, 800-659-5190
OH	Dayton, Marshall Inds.	513-898-4480
OH	Independence, Milgray Elctrns	216-447-1520
OH	Solon, Sterling Elctrns	216-248-1122
OH	Solon, Marshall Inds.	216-248-1788
OH	Solon, Reptron Elctrns	216-349-1415, 800-659-7476
OH	W. Chester, Sterling Elctrns	513-779-0418
OK	Tulsa, Sterling Elctrns	800-331-3514, 918-663-2410
OR	Beaverton, Marshall Inds.	503-644-5050
OR	Beaverton, Western Microtechnlg	503-629-2082
PA	Pittsburgh, Marshall Inds.	412-788-0441
TX	Austin, Marshall Inds.	512-837-1991
TX	Austin, Sterling Elctrns	512-836-1341
TX	Carrollton, Sterling Elctrns	214-243-1600
TX	Dallas, Milgray Elctrns	214-248-1603, 800-637-7227
TX	Houston, Marshall Inds.	713-467-1666
TX	Houston, Sterling Elctrns	713-627-9800
TX	Mansfield, Mouser Elctrns	817-483-4422, 800-346-6873
TX	Richardson, Marshall Inds	214-705-0600
TX	Stafford, Milgray Elctrns	800-962-1849, 713-240-5360
UT	Murray, Milgray Elctrns	801-261-2999, 800-537-9739
UT	Salt Lake City, Marshall Inds.	801-973-2288
UT	Salt Lake City, Sterling Elctrns	801-972-5444
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WI	Milwaukee, Marsh Elctrns	414-475-6000
WI	Waukesha, Marshall Inds.	414-797-8400
Can	Alb., Calgary, ITT Multicomponents	403-273-2780
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AL	Huntsville, Hughes Assocs Inc	205-533-9108
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FL	Boca Raton, Perrott Assoc	407-362-0191
FL	Casselberry, Perrott Assoc	407-830-0094
FL	Melbourne, Perrott Assoc	407-676-0305
FL	Palm Harbor, Hughes Assocs Inc	813-785-6696
GA	Norcross, Huges Assocs Inc	404-662-1587
IL	Bensenville, Horizon Tech. Sales	708-860-7900
MD	Burtonsville, Chesapeake Technlg	301-236-0530
MA	Wayland, Daner Hayes Inc	508-655-0888
MI	Ann Arbor, The Sys Grp	313-930-1800
MS	Corinth, Hughes Assocs	601-287-2915
NC	Cary, Hughes Assocs Inc	919-467-7029
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OR	Lake Oswego, Salestech Assoc	503-636-9559
TN	Knoxville, Hughes Assocs Inc	615-558-0283
TX	Austin, Oeler & Menelaides	512-453-0275
TX	Dallas, Oeler & Menelaides	214-361-8876
TX	Shanondohah, Oeler & Menelaides	713-894-5021
WA	Redmond, Salestech Assoc	206-869-5412
Intl	Australia, NSW, Petersham, Uni-Carter Semiconductor	612-550-0166
Intl	Australia, Victoria, Ringwood, Dynamic Comp Sales	3-873-4755
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Intl	France, Malmaison, Rep France	33147083090
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Intl	Taiwan, Taipei, Data Fast Electrns	02-766-3226

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CA	Tustin, JACO Elctrns Inc.	714-258-9003
CA	Westlake Village, JACO Elctrns Inc	805-495-9998
DC	Washington, DC, Vantage Comps	1-800-843-0707, 301-621-8555
FL	Altamonte Springs, Vantage Comps	407-682-1199
FL	Baca Raton, JACO Elctrns Inc	407-241-7943
FL	Ft. Lauderdale, Nu Horizons	305-735-2555
GA	Norcross, Nu Horizons	404-416-8666
MD	Columbia, JACO Elctrns Inc.	301-995-6620
MD	Columbia, Nu Horizons	301-995-6330
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MA	Billerica, Vantage Comps	1-800-552-4305, 508-667-2400
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MA	Wakefield, Nu Horizons	617-246-4442
NJ	Clifton, Vantage Comps	201-777-4100
NJ	Marlton, Nu Horizons	609-596-1833
NJ	Pine Brook, Nu Horizons	201-882-8300
NY	Amityville, Nu Horizons	516-226-6000
NY	Amityville, Nu Horizons	516-226-6000
NY	Hauppauge, JACO Elctrns Inc	516-273-5500
NY	Rochester, Nu Horizons	716-292-0777
NY	Smithtown, Vantage Comps	516-543-2000
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NC	Raleigh, Vantage Comps	919-870-9905
TX	Addison, JACO Elctrns Inc	214-733-4300
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TX	Stafford, JACO Elctrns Inc	713-240-2255

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AZ	Scottsdale, TDSI	602-998-2444
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CA	San Jose, Silicon Valley Sls	408-432-1967
CA	Santa Paula, Petra Prods	805-525-9599
CT	Bethel, Ray Perron Co	203-798-0261
CT	Prospect, Ray Perron Co	203-758-5262
FL	Deerfield Bch, MEC	305-426-8944
FL	Largo, MEC	813-393-5011
FL	Winter Springs, MEC	407-366-1379
GA	Norcross, Electramark, Inc	404-446-7915
IN	Crawfordsville, Edmar Rep Assocs	317-364-1871
IA	Cedar Rapids, Advanced Tech Sls	319-393-8280
KS	Olathe, Advanced Tech Sls	913-782-8702
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MN	Eden Prairie, Com-Tek Sls	612-941-7181
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NM	Albuquerque, TDSI	505-883-4343
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OH	Middleburg Hghts, Technology Mktg Corp	216-885-5544
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Intl	Taiwan, Taipei ROC, Keystone Technology Inc	
Intl	United Kingdom, Bucks, Young Ecc Electrns	628-810727

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CA	Industry, Ital Elctrns Sls, Inc	818-968-8515
CA	Irvine, Kelex	800-422-7224
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CA	San Diego, Added Value	619-558-8890
CA	Tustin, Added Value	714-259-8258
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NY	Rochester, CAM/RPC Elctrns	716-427-9999
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OH	Dayton, CAM/RPC Elctrns	513-898-1111
OH	Highland Hghts, CAM/RPC Elctrns	216-461-4700
OH	Worthington, CAM/RPC Elctrns	614-888-7777
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PA	Pittsburgh, Semicond. Specialists, Inc	412-963-7241
TX	El Paso, Intertron, S.A. de C.V.	915-857-8105
UT	West Valley City, Added Value	801-975-9500
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Intl	Hong Kong, Array Electrns, Ltd.	4816832
Intl	Hong Kong, Kowloon, HI-REL (Hong Kong) Ltd.	3-7588688
Intl	Hong Kong, North Point, S & T Enterprises, Ltd.	5-784921
Intl	Mexico, Colonia Santo Tomas, Intertron, S.A. de C.V.	525-341-7772
Intl	Mexico, Colonia Tecnologico, Intertron, S.A. de C.V.	5283-59-62-40
Intl	Mexico, Guadalajera, Jalisco, Intertron, S.A. de C.V.	5236-13-66-27
Intl	Mexico, Tijuana, Intertron, S.A. de C.V.	5266-84-01-60
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Intl	Singapore, Carter Semiconductors PTE Ltd.	734-7424
Intl	Switzerland, Bahnstrasses, MOOR Electrn AG	01-843-3111

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NH	Bedford, NMB Technologies Inc.	603-626-4643
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TX	Austin, NMB Technologies Inc.	512-441-3979
TX	Dallas, NMB Technologies Inc	214-243-0600
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Intl	France, NMB France	39-80-34-01
Intl	Germany, NMB GmbH-Minebea	06103-75-08-0
Intl	Hong Kong, Kowloon, Minebea Co., Ltd.	3-7390113
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Intl	United Kingdom, Berkshire, NMB (U.K.) Ltd.	0344-426611

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Sales Office & Representatives

AL	Huntsville, The Novus Group, Inc.	205-534-0044
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CA	Santa Clara, Criterion Sales, Inc.	408-988-6300
CA	Sunnyvale, OKI Semiconductor	408-720-8940
CA	Woodland Hills, Technology Solutions Co.	818-704-1693
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CT	Woodbury, Lindco Assocs Inc	203-266-0728
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FL	Casselberry, Dyne-A-Mark Corp	407-831-2822
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KY	Versailles, R.O. Whitesell	606-873-1182
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MA	Andover, OKI Semiconductor	508-688-8687
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PA	Pittsburgh, R.O.Whitesell	412-963-6161
TN	Knoxville, R.O. Whitesell	615-694-9476
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Can	Ontario, Orleans, Source Electrns Ltd	613-837-0220
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Intl	Japan, Tokyo, Oki Elec Industry Co., Ltd.	3-5386-8100
PR	Puerto Rico, San Juan, OKI Semiconductor	809-766-2422

Distributors

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AZ	Phoenix, Sterling Electrns	602-437-5565
AZ	Scottsdale, A.V.E.D.	602-951-9788
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CA	Fountain Valley, Bell Microproducts	714-963-0667
CA	Orange, Western Microtechnology	714-637-0200
CA	San Diego, A.V.E.D.	619-558-8890
CA	San Diego, Sterling Electrns	619-560-8097
CA	San Diego, Western Microtechnology	619-453-8430
CA	San Jose, Bell Microproducts	408-451-9400
CA	San Jose, Jaco Electrns, Inc.	408-432-9290
CA	San Jose, Sterling Electrns	408-435-0835
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CA	Tustin, Jaco Electrns, Inc.	714-258-9003
CA	Tustin, Sterling Electrns	714-259-0900
CA	Visalia, A.V.E.D.	209-734-8361
CA	Westlake, Jaco Electrns, Inc.	805-495-9998
CO	Englewood, Sterling Electrns	303-792-3939
CO	Wheatridge, A.V.E.D.	303-422-1701
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CT	Wallingford, Sterling Electrns	203-265-9535
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FL	Boca Raton, Jaco Electrns, Inc.	407-241-7943
FL	Ft. Lauderdale, Reptron Electrns	305-735-1112
FL	Tampa, Reptron Electrns	813-854-2351
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GA	Norcross, Reptron Electrns	404-446-1300
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IL	Schaumburg, Sterling Electrns	708-303-9900

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MD	Columbia, Jaco Electrns, Inc.	301-995-6620
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MA	Needham, Cronin Electrns, Inc.	617-449-5000
MA	Tewksbury, Jaco Electrns, Inc.	508-640-0010
MA	Wilmington, Bell Microproducts	508-658-0222
MA	Woburn, Sterling Electrns	617-938-6200
MI	Farmington, Advent Electrns	313-477-1650
MI	Livonia, Reptron Electrns	313-525-2700
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NJ	Elmwood Park, Phase One Technology	201-791-2990
NJ	Marlton, Western Microtechnology	609-596-7775
NM	Albuquerque, Sterling Electrns	505-884-1900
NY	Deer Park, Phase One Technology	516-254-2600
NY	E. Syracuse, Cronin Elctrns Inc	315-433-0033
NY	Hauppauge, Jaco Electrns Inc.	516-273-5500
NC	Raleigh, Jaco Electrns, Inc.	919-876-7767
NC	Raleigh, Reptron Electrns	919-870-5189
OH	Solon, Reptron Electrns	216-349-1415
OH	Worthington, Reptron Electrns	614-436-6675
OK	Tulsa, Sterling Elctrns	918-663-2410
OR	Beaverton, Western Microtechnology	503-629-2082
TX	Austin, Jaco Electrns, Inc.	512-835-0220
TX	Austin, Sterling Electrns	512-836-1341
TX	Carrollton, Sterling Electrns	214-243-1600
TX	Houston, Sterling Electrns	713-627-9800
TX	Richardson, Jaco Electrns, Inc.	214-234-5565
TX	Sugarland, Jaco Electrns, Inc.	713-240-2255
UT	Salt Lake City, Sterling Electrns	801-972-5444
UT	West Valley, A.V.E.D.	801-975-9500
VA	Richmond, Sterling Electrns	804-226-2190
WA	Redmond, Western Microtechnology	206-881-6737
Can	B.C., Vancouver, Active Electrns	604-324-7500
Can	Ontario, Ottawa, Active Electrns	613-728-7900
Can	Quebec, Montreal, Active Electrns	514-731-7441
Can	Quebec, Pointe Claire, Active Electrns	514-694-7710

ONCHIP SYSTEMS, INC., 1190 Coleman Avenue, San Jose, California 95110-1105, Tel: 408-988-5400, FAX: 408-988-5488

OPTICAL ELECTRONICS INC., P.O. Box 11140, Tucson, Arizona 85734, Tel: 602-889-8811

OPTIMUM SEMICONDUCTOR, 2231 Calle de Luna, Santa Clara, California 95054, Tel: 408-748-1111, FAX: 408-980-8209

Sales Office & Representatives

AL	Huntsville, Southeast Tech. Grp.	205-534-2376
AZ	Tempe, Altek Comps	602-345-4104
CA	Anaheim, Westrep	714-527-2822
CA	Grass Valley, Linetronics, Inc.	916-268-1737
CA	San Diego, Quest-Rep, Inc.	619-565-8797
CA	Santa Clara, Linetronics, Inc.	408-748-2970
CA	Santa Clara, Catalyst Semi. Sls.	408-748-7700
CO	Wheat Ridge, Wescom Mktg., Inc.	303-422-8957
CT	Cheshire, Connecticut Applied Tech.	201-272-6564
FL	Melbourne, Photon Sls., Inc.	407-259-8999
FL	Orlando, Photon Sls., Inc.	407-896-6064
FL	Pompano, Photon Sls., Inc.	305-977-6872
FL	St. Petersburg, Photon Sls., Inc.	813-578-0056
GA	Lawrenceville, Southeast Tech. Grp.	404-979-2055
ID	Boise, Emerging Tech. of Idaho	208-378-4680
IL	Itasca, LTD Tech., Inc.	708-773-2900
IL	Roscoe, LTD Tech., Inc.	815-389-4316
IN	Carmel, Bailey,s Elec. Sls. & Tech.	317-848-9958
KS	Overland Park, Electri-Rep., Inc.	913-649-2168
MD	Annapolis, Electrn Eng. & Sls., Inc.	301-269-4234
MD	Germantown, Electrn Eng. & Sls., Inc.	301-916-4133
MI	Bloomfield Hills, Enco Mktg., Inc.	313-338-8600
MN	Eden Prairie, Hanna Lind Ltd.	612-942-8554
MO	St. Louis, Electri-Rep., Inc.	314-993-4421
MT	Meridian, Southeast Tech. Grp., Inc.	601-485-7055
NH	Salem, Integrated Tech., Inc.	603-898-6333
NJ	Mt. Laurel, Paragon Sls. & Mktg.	609-778-1190
NJ	West Milford, Dynamic Sls. Assoc.	201-728-1044
NY	Fairport, BBD Electrns, Inc.	716-425-4101
NY	Melville, Parallax	516-351-1000
NC	Zebulon, Southeast Tech. Grp., Inc.	919-269-5589
OH	Centerville, Omega Sales., Inc.	513-434-5507
OH	Cleveland, Omega Sls.,Inc.	216-360-9400
OR	Portland, Adapt Electrns	503-297-2151
PA	Harrisburg, Paragon Sls. & Mktg.	717-657-2063
TX	Austin, Logic 1 Sales, Inc.	512-345-2952
TX	Houston, Logic 1 Sales, Inc.	713-444-7594
TX	Richardson, Logic 1 Sales, Inc.	214-234-0765
VA	Manassas, Electrn Engnrg. & Sls., Inc.	703-690-7984
VA	Remington, Electrn Engnrg. & Sls., Inc.	703-439-2810
WA	Seattle, Adapt Electrns	206-538-0211
WI	Milwaukee, LTD Tech., Inc.	414-774-1000
Can	B.C., Delta, Mirika Ventures Ltd.	604-943-5020
Can	Ontario, Kanata, J-Squared Tech., Inc.	613-592-9540
Can	Ontario, Rexdale, J-Squared Tech., Inc.	416-674-0927
Intl	Australia, Melbourne, Veltek Pty Ltd.	61-3-808-7511
Intl	Austria, Vienna, Ing. Ernst Steiner	43-222-82-7474
Intl	Brazil, Porto Allegro, Arrow Bras	55-512-43-7950
Intl	Denmark, Allerod, Delco A.S.	45-42-27-77-33
Intl	England, Chinner, Silicon Pacific	44-234-240-498
Intl	England, Reading, Microprocessor & Memory Dist. Ltd.	44-734-313-232
Intl	Finland, Espoo, Telercas	358-0-452-1622
Intl	France, Le Vesinet, ATD Electronique	33-1-39-76-39-84
Intl	France, Massy Cedex, Datadis S.A.	33-1-69-20-41-41
Intl	France, Sevres, Tekelec Airtronic	33-1-46-23-24-25
Intl	France, Velizy Cedex, Mustronic	33-1-34-65-90-44
Intl	Germany, Munchen, Neumuller GmbH	49-89-61208-227
Intl	Germany, Munich, Tekelec Airtronic GmbH	49-89-51640
Intl	Holland, Ijssel, Alcom Elec. B.V.	31-10-451-9533
Intl	Hong Kong, Kwai Fong, Randy Elec. Co., Inc.	852-3-7953-889
Intl	Israel, Azur, Seg Tec	972-3-556-7458
Intl	Italy, Milano, Silverstar Ltd. S.P.A.	39-2-661-251
Intl	Japan, Tokyo, Marubun Corp.	81-3-639-9851
Intl	Korea, Seoul, D&S Corp.	82-2-575-4490
Intl	Krefeld, Trias Reps.	49-21-51-476701
Intl	Malaysia, Singapore, Serial Sys. Mktg.	65-2938830
Intl	Norway,Oslo, Henaco A.S.	47-2-162-110
Intl	Singapore, Marubun Elec. Pte Ltd.	65-223-8855
Intl	Spain, Madrid, ATD Electrna S.A.	34-1-534-4000
Intl	Sweden, Spanga, Pelcon Electrns AB	8-795-98-70
Intl	Switzerland, Baden-Dattwill, Ascom Primotec AG	41-56-84-0171
Intl	Taiwan, Taipei, Marubun Taiwan Inc.	02-719-0211
Intl	Taiwan, Taipei Hsien, Princeton Tech. Corp.	886-2-917-8856

Distributors

FL	Miami, All American Semiconductor	305-621-8282
NY	Amityville, Nu Horizons Elec.	516-226-6000
NY	Farmingdale, Milgray Electrns	516-420-9800
NY	Melville, Arrow Elec. Corp.	516-391-1300
OH	Columbus, Elec. Mktg. Corp.	614-299-4161
Can	Ontario, Markham, Semad	416-475-8500
Can	Quebec, Pointe Claire, Future Elec.	514-694-7710

OPTOTEK LIMITED, 62 Steacie Drive, Kanata, Ontario, Canada K2K 2A9, Tel: 613-591-0336, FAX: 613-591-0584

ORION INSTRUMENTS, INC., 180 Independence Drive, Menlo Park, California 94025, Tel: 415-327-8800, FAX: 415-327-9881

PACIFIC MICROELECTRONICS CENTRE, 8999 Nelson Way, Burnaby, British Columbia, Canada V5A 4B5, Tel: 604-293-5755, FAX: 604-293-6012

Sales Office & Representatives

AZ	Tempe, Cantec Sales,Inc	602-345-1276
CA	Milpitas, Emerging Technlg Sls, Inc	408-263-9366
CA	Milpitas, Emerging Technlg Sls, Inc	408-263-9366
CT	Wallingford, Technology Sls, Inc	203-269-8853
MD	Columbia, Delta III Assocs Inc	410-730-4700
MA	Waltham, Technology Sls, Inc	617-890-5700
NY	Fairport, Technology Sls, Inc	716-223-7500
NY	Ithaca, Technology Sls, Inc	607-257-7070
TX	Austin, Impaq Sls	512-335-9666
TX	Houston, Impaq Sls	713-820-0288
TX	Irving, Impaq Sls	214-650-0000
VA	Midlothian, Delta II Assocs, Inc	804-379-1816
Can	Ont., Willowdale, Cana Rep	416-250-6683
Intl	Taiwan, Taipei ROC, Heli-Ocean Technlg Co Ltd	9-011-886-27229000

PANASONIC INDUSTRIAL COMPANY/ELECTRONIC COMPONENTS DIVISION, Matsushita Electric Corporation of America, 1600 Mc Candless Drive, Milpitas, California 95035, Tel: 408-946-4311, TWX: 710-992-8920

Sales Office & Representatives

CA	Milpitas, Panasonic Industrial Co.	408-946-9063
GA	Norcross, Panasonic Industrial Co.	404-717-6848
IL	Arlington Heights, Panasonic Industrial Co.	708-981-7323
IL	Franklin Park, Panasonic Industrial Co.	708-452-2643
MA	Westborough, Panasonic Industrial Co.	508-836-2678
NJ	Secaucus, Pnasonic Industrial Co.	201-348-5291
TX	Houston, Panasonic Industrial Co.	713-449-6400
WA	Kent, Panasonic Industrial Co.	206-395-0670
WA	Puyallup, Matsushita Semiconductor Corp. of America	206-841-6000

Distributors

AL	Huntsville, Marshall Inds	205-881-9235
AZ	Phoenix, Marshall Inds	602-496-0290
CA	Calabasas, Marshall Inds	818-878-7000
CA	Chatsworth, Marshall Inds	818-407-4100
CA	El Monte, Marshall Inds	818-307-6089
CA	Irvine, Marshall Inds	714-458-5301
CA	Milpitas, Marshall Inds	408-942-4630
CA	Rancho Cordova, Marshall Inds	916-635-9700
CA	San Diego, Marshall Inds	619-578-9600
CA	San Jose, Jaco/Distel Inc.	408-432-9290
CA	Tustin, Jaco/Distel, Inc.	714-258-9003
CA	Westlake, Jaco/Distel, Inc.	805-495-9998
CO	Thornton, Marshall Inds	303-451-8444
CT	Wallingford, Marshall Inds	203-265-3822
FL	Altamonte Springs, Marshall Inds	407-767-8585
FL	Boca Raton, Jaco/QC	817-241-7943
FL	Ft. Lauderdale, Marshall Inds	305-977-4880
FL	St. Petersburg, Marshall Inds	813-573-1399
GA	Norcross, Jaco/QC	404-449-9508
GA	Norcross, Marshall Inds	404-923-5750
IL	Schaumburg, Marshall Inds	708-490-0155
IN	Indianapolis, Marshall Inds	317-297-0483
KS	Lenexa, Marshall Inds	913-492-3121
MD	Columbia, Jaco Electrns, Inc.	301-995-6620
MD	Silver Spring, Marshall Inds	301-622-1118
MA	Tewksbury, Jaco Electrns, Inc.	508-640-0010
MA	Wilmington, Marshall Inds	508-657-9045
MI	Livonia, Marshall Inds	313-525-5850
MN	Plymouth, Marshall Inds	612-559-2211
MO	Bridgeton, Marshall Inds	314-291-4650
NJ	Fairfield, Marshall Inds	201-882-0320
NJ	Mt. Laurel, Marshall Inds	609-234-9100
NY	Farmingdale, Pride Electrns	516-293-4020
NY	Hauppauge, Jaco Electrns, Inc.	516-273-5500
NY	Hauppauge, Marshall Inds	516-273-2424
NY	Johnson City, Marshall Inds	607-798-1611
NY	Raleigh, Jaco/QC	919-876-7767
NY	Rochester, Marshall Inds	716-235-7620
NC	Raleigh, Marshall Inds	919-878-9882

OH	Dayton, Marshall Inds	513-898-4480
OH	Solon, Marshall Inds	216-248-1788
OR	Addison, Jaco/QC	214-733-4300
OR	Beaverton, Marshall Inds	503-644-5050
OR	Pittsburgh, Marshall Inds	412-788-0441
TX	Austin, Jaco/QC	512-835-0220
TX	Austin, Marshall Inds	512-837-1991
TX	Brownsville, Marshall Inds	512-542-4589
TX	Carrollton, Marshall Inds	214-233-5200
TX	Houston, Marshall Inds	713-895-9200
TX	Sugar Lane, Jaco/QC	713-240-2255
Can	Ontario, Brampton, Marshall Inds	416-458-8046
Can	Quebec, Pointe Claire, Marshall Inds	514-694-8142

PARADIGM TECHNOLOGY, INC., 71 Vista

Montana, San Jose, California 95134, Tel: 408-954-0500, FAX: 408-954-8913

Sales Office & Representatives

AL	Huntsville, Electrn Mktg. Assocs.	205-880-8050
AZ	Phoenix, Sun State Tech. Sls.	602-220-0595
CA	Agoura Hills, Premier Tech Sls	818-707-7120
CA	Irvine, Premier Tech Sls	714-727-0452
CA	Los Angeles, Paradigm Tech. Inc.	213-312-9563
CA	San Diego, Littlefield & Smith	619-455-0055
CA	San Jose, Paradigm Tech. Inc.	408-954-0500
CA	Santa Clara, Premier Tech. Sls.	408-736-2260
CA	Westlake Village, Premier Tech Sls	805-379-6762
CO	Englewood, Comp Sls., Inc.	303-779-8060
FL	Altamonte Springs, Kinetic Sls. Inc.	407-339-3855
FL	Palm Harbor, Kinetic Sales, Inc.	813-934-3768
GA	Atlanta, Elec. Mktg. Assocs.	404-448-1215
ID	Boise, Harris Mktg	208-338-6515
IL	Northbrook, Dolan Sls. Co., Inc.	708-498-6770
IA	Cedar Rapids, Cahill,Schmitz & Howe, Inc.	319-377-8219
MD	Columbia, Avtek Assocs., Inc.	301-740-5100
MA	Walpole, Paradigm Tech. Inc.	508-668-2508
MA	Waltham, Datcom	617-891-4600
MI	Brighton, AP Assocs., Inc.	313-229-6550
MN	St. Paul, Cahill, Schmitz & Howe, Inc.	612-646-7217
NJ	Cherry Hill, Tritek Sls., Inc.	609-667-0200
NM	Albuquerque, Nelco Electronix	505-293-1399
NY	Jericho, J-Square Mktg, Inc.	516-935-3200
NC	Raleigh, Electrn Mktg. Assocs.	919-847-8800
OH	Dayton, The Lyons Corp	513-278-0714
OH	Richfield, The Lyons Corp	216-659-9224
OH	Westerville, The Lyons Corp	614-895-1447
OR	Beaverton, Olson Tech. Sls.	503-643-9488
TX	Austin, Synergistic Sls Inc	512-346-2122
TX	Houston, Synergistic Sls Inc	713-937-1990
TX	Richardson, Synergistic Sls Inc	214-644-3500
UT	Salt Lake City, Harris Mktg.	208-338-6515
VA	Esmont, Avtek Assocs., Inc.	804-295-1294
WA	Bellevue, Olson Tech. Sls.	206-883-7792
WI	Glendale, Dolin Sls. Co., Inc.	414-482-1111
Can	B.C., Vancouver, Olson Tech. Sls.	604-980-5801
Intl	Hong Kong, Kwai Fong, N.T., Memec (Asia Pacific)	0118524180909
Intl	Korea, Kangnam-ku, Seoul, Memec (Asia Pacific)	0118225635277

Distributors

AL	Huntsville, Nu-Horizons Elctrns	205-722-9330
CA	Agoura Hills, Western Microtechnology	818-707-0377
CA	Camarillo, Milgray	805-484-4055
CA	Irvine, Milgray	714-753-1282
CA	Orange, Western Microtechnology	714-637-0200
CA	Reseda, Jan Devices	818-708-1100
CA	San Diego, Western Microtechnology	619-453-8430
CA	San Jose, Milgray	408-456-0900
CA	Saratoga, Western Microtechnology	408-725-1660
CT	Milford, Milgray	203-878-5538
FL	Ft. Lauderdale, Nu-Horizons	305-735-2555
FL	Lake Mary, Milgray	407-321-2555
GA	Norcross, Nu-Horizons Elec.	404-416-8666
GA	Norcross, Milgray	404-446-9777
IL	Palatine, Milgray	708-202-1900
KS	Overland Park, Milgray	913-236-8800
MD	Columbia, Nu-Horizons	410-995-6330
MD	Columbia, Milgray	301-995-6169
MA	Burlington, Western Microtechnology	617-273-2800
MA	Wakefield, Nu Horizons Elec.	617-246-4442
MA	Wilmington, Milgray	508-657-5900
NJ	Marlton, Nu Horizons Elec.	609-596-1833
NJ	Marlton, Western Microtechnology	609-596-7775
NJ	Marlton, Milgray	609-983-5010
NJ	Parsippany, Milgray	201-335-1766
NJ	Pine Brook, Nu Horizons Elec.	201-882-8300
NY	Amityville, Nu Horizons Elec.	516-226-6000
NY	Farmingdale, Milgray	516-420-9800
NY	Pittsford, Milgray	716-381-9700
NY	Rochester, Nu Horizons Elec.	716-292-0777
NC	Raleigh, Milgray	919-790-8094
OH	Cleveland, Milgray	216-447-1520
OR	Beaverton, Western Microtechnology	503-629-2082
TX	Dallas, Milgray	214-248-1603
TX	Stafford, Milgray	713-240-5360
UT	Murray, Milgray	801-261-2999
WA	Redmond, Western Microtechnology	206-881-6737
Can	Ont., Willowdale, Milgray	416-756-4481
Can	Que., Quebec, Milgray	514-426-5900
Intl	France, Voisins-Le-Bretonneux, Eurocomposant	011-331-30649515
Intl	Germany, Hamburg, Atlantik Elec.	011-498-333-05812
Intl	Germany, Martinsried, Atlantik Elec.	011-498-985-70000
Intl	Israel, Givataim, Eldis Technlgs Ltd	011-972-3-571-0222
Intl	Italy, Balsamo, Milano, Comprel SpA	011392612641
Intl	Japan, Tokyo, Nippon Imex Corp.	011-813-332-18000
Intl	Spain, Madrid, Amitron S.A.	011-341-542-0906
Intl	Sweden, Nacka, Memec Scandinavia	011-468-643-4190
Intl	Taiwan, Taipei, Acer Sertek Inc.	011-025-010-055
Intl	Taiwan, Taipei, Adona Corp.	011-271-83699
Intl	U.K., Berkshire, Manhattan Skyline Ltd	011-440628-778686
PR	Canovanas, Milgray	809-876-8200

PERFORMANCE ELECTRONIC PACKAGING SERVICES, INC.

FAX: 619-471-9691

PERFORMANCE ELECTRONIC PACKAGING SERVICES, 1565 Creek

Street, San Marcos, California 92069, Tel: 619-471-5383, FAX: 619-471-9691

PERFORMANCE MOTION DEVICES, 11

Carriage Drive, Chelmsford, Massachusetts 01824, Tel: 508-256-1913, FAX: 508-256-0206

PERFORMANCE SEMICONDUCTOR

CORP., 610 E. Weddell Drive, Sunnyvale, California 94089, Tel: 408-734-8200

Sales Office & Representatives

AL	Huntsville, ELCOM	205-830-4001
AZ	Tempe, Altek Comps	602-345-4575
AZ	Tuscon, Altek Comps	602-529-0443
CA	Huntsville, Performance Semi	205-830-0254
CA	San Diego, Harper & Strong	619-549-5360
CA	Santa Clara, Phase II Tech Sls	408-980-0414
CA	Signal Hill, Harper & Strong	310-424-3030
CA	Sunnyvale, Performance Semi.	408-734-8200, 408-747-1500
CO	Denver, Bell Inds	303-691-9010
CO	Wheatridge, Waugaman Assoc.	303-423-1020
CT	Conn Tech Sls	203-272-1277
FL	Altamonte Springs, Semtronic Assoc	407-831-8233
FL	Clearwater, Semtronic Assoc	813-461-4675
FL	Ft. Lauderdale, Semtronic Assoc	305-731-2484
FL	Longwood, Performance Semi	407-339-7003
GA	Norcross, ELCOM	404-447-8200
IL	Inverness, Heartland Tech Mktg	708-358-6622
IL	Schaumburg, Performance Semi	708-303-0343
IN	Ft. Wayne, Bell Inds	219-422-4300
IN	Indianapolis, CC Electro Sls	317-921-5000
IN	Indianapolis, Bell Inds	317-875-8200
IA	Cedar Rapids, Lorenz Sls, Inc	319-377-4666
KS	Overland Park, Lorenz Sls Inc	913-469-1312
KS	Wichita, Lorenz Sls, Inc	316-721-0500
MD	Severna Pk, Performance Semi	410-544-9660
MD	Towson, Arbotek Assoc	410-825-0775
MA	Newton Lower Falls, Performance Semi	617-332-0044
MA	Westford, Nashoba Group	508-692-7503
MI	Grand Rapids, CC Electro Sls	616-281-8800
MI	Plymouth, CC Electro Sls	313-455-0000
MN	Roseville, Victor Comps Sls	612-631-1334
MO	St. Louis, Lorenz Sls Inc	314-997-4558
NE	Lincoln, Lorenz Sls, Inc	402-475-4660
NJ	Ramesy, North East Comps	201-825-0233
NY	E Rochester, Empire Tech Assoc	716-381-8500
NY	Endwell, Empire Tech Assocs	607-754-8756
NY	Skaneateles, Empire Tech Assocs	315-685-5703
NC	Gary, ELCOM	919-481-9610
OH	Cincinnati, Century Tech Sls	513-677-5088
OH	Cleveland, Century Tech Sls	216-871-2854
OH	Columbus, Century Tech Sls	614-433-7500
OH	Solon, Bell Inds	216-498-1437
OR	Beaverton, Western Tech Sls	503-644-8860
PA	Bristol, Bell Inds	215-788-5000
PA	Willow Grove, Performance Semi	215-830-0425
PA	Willow Grove, Tech Sls Assoc	215-784-0170
TX	Austin, Performance Semi	512-335-0078
TX	Austin, Gardin-Moore	512-794-2900
TX	Plano, Gardin-Moore	214-985-1193
TX	Stafford, Gardin-Moore	713-240-6767
UT	Salt Lake City, R2 Mktg Inc	801-595-0631
WA	Bellevue, Western Tech Sls	206-641-3900
WA	Spokane, Western Tech Sls	509-922-7600
WI	Brookfield, Heartland Tech Mktg	414-789-6860
WI	Waukesha, Bell Inds	414-547-8879
Can	B.C. Richmond, Tech-Trek	604-276-8735
Can	Ont., Kanata, J-Squared Technlgs, Inc	613-592-9540
Can	Ont., Rexdale, J-Squared Technlgs, Inc	416-674-0927
Can	Que., Pointe Claire, J-Squared Technlgs, Inc	514-694-8330
Intl	Australia, Dingley, Victoria, R & D Electrns	61-3-558-0444
Intl	Australia, Sydney, R & D Electrns	61-2-712-3855
Intl	Austria, Vienna, Transohm	43-222-610-66-0
Intl	England, Basing Stoke, Amiga Elctrns Ltd	44-256-330301
Intl	England, Hampshire, Performance Semi	011-44-256-59585
Intl	England, Twy Ford, GD Technik Ltd	44-734-342277
Intl	France, Les Ulls, Cedex, Immeuble Micro	33-1-69-07-08-24
Intl	France, Sevres, Cedex, Tekelec	33-1-46-23-24-25
Intl	Germany, Heidenheim, Ineltek GmbH	49-7321-20077
Intl	Germany, Kaltenkirchen, GTS	49-4191-8711
Intl	Germany, Munich, Avnet	49-89-451-1004
Intl	Hong Kong, Kowloon, Tektron Elctrns	852-388-0629
Intl	Hong Kong, Kowloon, TLG Elctrns Ltd	852-388-7613
Intl	India, Bombay, Sapphire Innovators Pvt Ltd	91-22-231-040/224-165/230-704
Intl	Israel, Tel Aviv, Startronics	972-3-696-0148
Intl	Italy, Paderno Dugnano, Consystem SrL	39-2-99041977/8/9/10
Intl	Japan, Tokyo, Teksel Co. Ltd.	81-44-812-7430
Intl	Japan, Tokyo, Tomen Integrated Technlg Corp	81-4-2528-3641
Intl	Netherlands, Eindhoven, A-Top Electrns B.V.	Fax 31-10-447440
Intl	Norway, Oslo, Henaco A/S	47-22-162110
Intl	Singapore, Technlg Distribs PTE LTD	65-299-7811
Intl	South Korea, Seoul, New Seoul Trading	82-2-546-4196/7
Intl	Spain, Madrid, Lober S.A.	34-1-3-10-29-25
Intl	Sweden, Taby, Bexab Technlg AB	46-8-6308810
Intl	Switzerland, Aire-La-Ville, Abalec AG	41-22-7572902

Intl	Switzerland, Schlieren, Abalec AG	41-1-730-0455
Intl	Taiwan, Taipei, Hiltron Technlg	886-2-298-3456
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NJ	Cherry Hill, Tritek Sls	609-667-0200
NJ	Springfield, Radix Inc	201-467-4970
NC	Cary, The Novus Grp, Inc	919-460-7771
OH	Dayton, Midwest Mktg Assocs (Southern)	513-433-2511
OH	Lyndhurst, Midwest Mktg Assocs (Northern)	216-381-8575
OH	Solon, Pioneer Standard Elctrns	216-349-1300
OH	Twinsburg, Pioneer Standard Elctrns	216-487-5500
OR	Portland, Electrn Engnr Sls	503-639-3978
TN	Maryville, The Novus Grp, Inc	615-681-8895
TX	Austin, Southern States Mktg	512-835-5822
TX	El Paso, Sanford Sls Assocs, Inc	915-598-1455
TX	Houston, Southern States Mktg	713-868-5180
TX	Richardson, Southern States Mktg	214-238-7500
WA	Redmond, Electrn Engnr Sls	206-883-3374
WI	West Allis, Metcom Assocs Corp	414-476-1300

Can	Ont., Ottawa, Dynasty Comps, Inc	613-596-9800
Intl	Australia, Leichardt NSW, Braemac Pty Ltd	2-564-1211
Intl	Belgium, Brussels, Microlink NV	521-8650
Intl	Bulgaria, Sofia, Macro Grp	2/525537
Intl	Bulgaria, Sofia, Macro Grp	2-525537
Intl	Croatia, Accord SrL	040-899-2230
Intl	Czechoslavakia, Praha, Macro Weil spol. s.r.o.	311-2182
Intl	Denmark, Lynge, Prescom A/S	4218-9800
Intl	England, Hampshire, Power Integrations (Europe) Ltd	0256-468186
Intl	England, Reading Berks, Sirretta Microelec Ltd	734-756-121
Intl	Finland, Vantaa, Aspecs Oy	507-2299
Intl	France, Wissous, Axess Technlg	1-6011-1110
Intl	Germany, Dreieich, Tekelec Airtronic GmbH	6103-35257
Intl	Germany, Hamburg, Tekelec Airtronic GmbH	40-656-896
Intl	Germany, Ludwigsburg, Tekelec Airtronic GmbH	71-41-33088
Intl	Germany, Munich, Tekelec Airtronic GmbH	89-51640
Intl	Hungary, Szamado, Macro IBudapest	1-868-033
Intl	India, Bangalore, Priya Intl Ltd	214027, 214395
Intl	India, Bombay, Priya Intl Ltd	286-3611
Intl	India, Calcutta, Priya Intl Ltd	22-2378
Intl	India, Madras, Priya Intl Ltd	45-1031
Intl	India, New Delhi, Priya Intl Ltd	331451
Intl	India, Secunderabad, Priya Intl Ltd	81-3549
Intl	Israel, Tel-Aviv, STG Intl Ltd	3-696-5231
Intl	Italy, Milano, Hantelec STL	2-66010-569
Intl	Japan, Kanagawa, Innotech Corp	45-474-9037
Intl	Japan, Kyoto, Matsushita Elctrns Corp	75-951-8151
Intl	Japan, Tokyo, Tomen Integrated Technlg Corp	0425-28-3641
Intl	Malaysia, Electrn Resources (Malaysia) SDN	3-703-8498
Intl	Netherlands, Sonetech Nederland bv	40-83-7075
Intl	Norway, Skedmokorset, NC Nordcomp Norway AS	63-879-330
Intl	Poland, Macropool Co. Ltd	22-11-29-33
Intl	Singapore, Elctrn Resources Private Ltd	2830-888
Intl	Slovakia, Zilina, Macro Comps S.R.O	89-34181
Intl	Slovenia, Ljubljana, Acorn d.o.o	061-182-520
Intl	Spain, Madrid, Selco SA	1-359-4346
Intl	Sweden, Solna, NC Nordcomp Sweden AB	8-764-6710
Intl	Switzerland, Wettingen, Elbatex	56-275-111
Intl	Taiwan, Taipei, ROC, MSI Grp	2-5063320

Distributors

AL	Huntsville, Pioneer Technlgs Grp	205-837-9300
AZ	Tempe, Bell Inds	602-966-3600
CA	Agoura Hills, Bell Inds'	818-879-9492
CA	Concord, Pioneer Standard Elctrns	415-676-1355
CA	Cypress, Bell Inds	714-895-7801
CA	Irvine, Pioneer Standard Elctrns	800-535-1430
CA	Los Angeles, Power Plus	310-446-4860
CA	Milpitas, Pioneer Standard Elctrns	408-945-9100
CA	Rocklin, Bell Inds	916-652-0418
CA	San Diego, Bell Inds	619-268-1277
CA	San Jose, Pioneer Technlgs Grp	408-954-9100
CA	Santa Fe Springs, Just-In-Time	310-921-3611
CA	Sunnyvale, Bell Inds	408-734-8570
CO	Denver, Bell Inds	303-691-2460
CT	Shelton, Pioneer Standard Elctrns	203-929-5600
CT	Wallingford, Bell Inds	203-269-6801
FL	Altamonte Springs, Pioneer Technlgs Grp	407-834-9090
FL	Altamonte Springs, Bell Inds	407-339-0078
FL	Deerfield Bch, Pioneer Technlgs Grp	305-428-8877
GA	Duluth, Pioneer Technlgs Grp	404-623-1003
GA	Norcross, Bell Inds	404-446-7167
IL	Addison, Pioneer Standard Elctrns	708-495-9680
IL	Elk Grove Village, Bell Inds	708-640-1910
IN	Fort Wayne, Bell Inds	219-422-4300
IN	Indianapolis, Just-In-Time	317-876-3740
IN	Indianapolis, Pioneer Standard Elctrns	317-573-0880
IN	Indianapolis, Bell Inds	317-875-8200
MD	Columbia, Bell Inds	410-290-5100
MA	Andover, Bell Inds	508-474-8880
MA	Lexington, Pioneer Standard Elctrns	617-861-9200
MI	Grand Rapids, Pioneer Standard Elctrns	616-698-1800
MI	Livonia, Pioneer Standard Elctrns	313-525-1800
MN	Eden Prairie, Pioneer Standard Elctrns	612-944-3355
MO	St. Louis, Pioneer Standard Elctrns	800-255-4350
NJ	Fairfield, Pioneer Standard Elctrns	201-575-3510
NJ	Fairfield, Bell Inds	201-227-6060
NM	Albuquerque, Bell Inds	505-292-2700
NY	Binghamton, Pioneer Standard Elctrns	607-722-9300
NY	Fairport, Pioneer Standard Elctrns	716-381-7070
NY	New York, Pioneer Standard Elctrns	212-971-9562
NY	Woodbury, Pioneer Standard Elctrns	516-921-8700
NC	Morrisville, Pioneer Technlgs Grp	919-460-1530
OH	Cincinnati, Pioneer Standard Elctrns	606-628-0028
OH	Cleveland, Pioneer Standard Elctrns	216-587-3600
OH	Dayton, Bell Inds	513-435-5922
OH	Dayton, Pioneer Standard Elctrns	513-236-9900
OH	Lexington, Pioneer Standard Elctrns	606-233-4564
OH	Reynoldsburg, Pioneer Standard Elctrns	614-236-1000
OK	Tulsa, Pioneer Standard Elctrns	918-665-7840
OR	Beaverton, Bell Inds	503-644-3444
PA	Horsham, Pioneer Technlgs Grp	215-674-4000
PA	Pittsburgh, Pioneer Standard Elctrns	412-782-2300
PA	Trevose, Bell Inds	215-953-2899
TX	Austin, Pioneer Standard Elctrns	512-835-4000
TX	Dallas, Pioneer Standard Elctrns	214-386-7300
TX	Fort Worth, Pioneer Standard Elctrns	214-263-3168
TX	Houston, Pioneer Standard Elctrns	713-879-3326
TX	Richardson, Bell Inds	214-690-0468
TX	San Antonio, Pioneer Standard Elctrns	512-377-3440
UT	Midvale, Bell Inds	801-561-9691
WA	Redmond, Bell Inds	206-881-2140
WI	Brookfield, Pioneer Standard Elctrns	414-784-3480
WI	Waukesha, Bell Inds	414-547-8879

PROXIMITY TECHNOLOGY INC., 3511 NE 22nd Av., Ft. Lauderdale, Florida 33308, Tel: 305-566-3511

QUALCOMM INCORPORATED, VLSI Products Division, 10555 Sorrento Valley Road, San Diego, California 92121-1617, Tel: 619-597-5005, FAX: 619-452-9096

Sales Office & Representatives

AZ	Tempe, Cain Technlg	602-966-4322
CA	Folsom, Disman-Bakner	916-983-1029
CA	Mountain View, Disman-Bakner	415-969-3010
CA	Van Nuys, Cain Technlg	818-904-9392
CO	Englewood, Cain Technlg	303-220-8118
FL	Palm Bay, Spar Tech Assocs	407-727-8045
FL	Palm Harbor, Spar Tech Assocs	813-787-0745
GA	Lawrenceville, Spar Tech Assocs	404-985-8282
IN	Fisher, Phoenix Mktg Grp Inc	317-439-5889
IA	Cedar Rapids, Midwest Tech Sls	319-377-1688
KS	Augusta, Midwest Tech Sls	316-775-2565
KS	Lenexa, Midwest Tech Sls	913-888-5100
MD	Columbia, Roberts Elctrn Sls	410-995-1900
MO	Earth City, Midwest Tech Sls	314-298-8787
NH	Amherst, TMR Assocs	603-672-9336
NY	Cicero, Bertram Aaron & Co	315-699-1573
NY	Pelham, Bertram Aaron & Co	914-738-2019
OR	Portland, Thorson Co. Northwest	503-293-9001
PA	Ft. Washington, Beta Sls	215-643-6650
TX	Austin, Thorson Co. Southwest	512-467-2737
TX	Dallas, Thorson Co. Southwest	214-233-5744
TX	Houston, Thorson Co. Southwest	713-558-8205
WA	Bellevue, Thorson Co. Northwest	206-455-9180
Can	B.C., Burnaby, Giga-Tron Assocs. Ltd	604-299-4244
Can	Ont., Ottawa, Giga-Tron Assocs. Ltd	613-225-4090
Intl	Australia, Adelaide, S.A., Veltek Pty. Ltd	61-8-232-3922
Intl	Australia, Cannington, W.A., Veltek W.A. Pty Ltd	61-9-351-9420
Intl	Australia, Five Dock, NSW, Veltek Pty Ltd	61-2-713-4100
Intl	Australia, Victoria, Burwood, Veltek Pty Ltd	61-3-808-7511
Intl	Belgium, Brussels, Microwave & RF Consultants SA	32-2-230-57-05
Intl	Belgium, Brussels, Microwave & RF Consultants	32-2-230-57-05
Intl	Brazil, Sao Paulo, Vermont Representacoes Comercials S/C Ltda	55-11-535-5679
Intl	Czechoslovakia, Prague, TransTech Praha spol.s.r.o.	42-2-806753
Intl	Denmark, Roskilde, BFI IBEXSA DANMARK A/S	45-46-75-31-31
Intl	England, Herefordshire, Chronos Technlg	44-989-85471
Intl	France, Cedex, Millimondes	31-1-45-37-12-30
Intl	Germany, Hamburg, Trans Tech Hochfrequenz GmbH	49-40-690-4342
Intl	Germany, Heilbronn, Trans Tech Hochfrequenz GmbH	49-7131-593-0
Intl	Germany, Lobau, Trans Tech Hochfrequenz GmbH	49-3585-84-23-81
Intl	Germany, Munchen, Trans Tech Hochfrequenz GmbH	49-89-843017
Intl	India, Bangalore, Synertec	91-812-585999
Intl	Israel, Ramat-Gan, Linkcom	972-3-752-1425
Intl	Italy, Viareggio, Micro SI ET s.n.c	39-584-54879
Intl	Japan, Tokyo, Intemix, Inc	81-3-3367-3221
Intl	Korea, Kyungki-Do, Korea Microwave Sls	82-331-33-9985
Intl	Netherlands, Maarssen, Hi-Tech Elctrn Comps	31-3465-66024
Intl	Norway, Tonsberg, Eurocom Telecommunications	47-33-31-79-36
Intl	Spain, Barcelona, Unitronics S.A	34-3-321-2800
Intl	Spain, Madrid, Unitronics, S.A.	34-1-542-5204
Intl	Sweden, Sollentuna, BFi IBEXSA Nordic AB	46-8-626-99-00
Intl	Switzerland, Wettingen, TransTech AG	41-56-271893
Intl	Taiwan, Taipei, ROC, Evergo Corp	886-2-7150283
Intl	Turkey, Istanbul, Elektro Sanayi Ve Ticaret Koll STI	90-1-337-22-45

QUALITY SEMICONDUCTOR, 851 Martin Avenue, Santa Clara, California 95050, Tel: 408-450-8080, FAX: 408-496-0773

Sales Office & Representatives

AL	Madison, Concord Comp Reps, Inc.	205-772-8883
AZ	Chandler, Techni-Source Corp	602-497-0711
CA	Encinitas, Bager Elctrns., Inc	619-632-8816
CA	Fountain Valley, Bager Elctrns., Inc	714-957-3367
CA	Santa Clara, Proherge	408-748-2970
CA	Santa Clara, QSI Main Sls Off	408-450-8080
CA	Woodland Hills, Bager Elctrns., Inc	818-712-0011
CO	Colorado Spring, Western Region Mktg., Inc.	719-548-8282
CO	Westminster, Western Region Mktg., Inc.	303-428-8088
FL	Deerfield Beach, Delmac Sls	305-427-7788
FL	Longwood, Delmac Sls	407-831-0040
FL	Tampa, Delmac Sls	813-935-1477
GA	Norcross, Concord Comp Reps, Inc.	404-416-9597
IL	Rolling Meadows, Eagle Tech. Sls	708-991-0700
IN	Indianapolis, L.M. Devoe Co	317-842-3245
KS	Olathe, G.M. Brown & Assocs	913-829-3086
MD	Glen Burnie, Logical Technlg	301-766-7444
MA	Burlington, Anacon Sls Assoc Inc	617-272-9080
MA	Framingham, QSI Eastern Sls Off	508-626-2200
MI	Grosse Point, Greiner Assocs Inc	313-499-0188
MN	Minneapolis, George Russell & Assocs.	612-854-1166
NY	Babylon, Astrorep Inc	516-422-2500
NY	Rochester, H.C. Johnston	716-586-0777
NC	Raleigh, Concord Comp Reps Inc	919-783-8038
OH	Centerville, Bear Mktg Inc	513-436-2061
OH	Richfield, Bear Mktg Inc	216-659-3131
OK	Brooken Arrow, Quad State Sls & Mktg	918-357-1352
OR	Portland, ES/Chase Co Inc	508-292-8840

PA	Allison Pk, Bear Mktg Inc	412-492-1150
PA	Plymouth Meeting, CMS Sls & Mktg., Inc.	215-834-6840
TX	Austin, Quad State Sls	512-346-7002
TX	Dallas, Quad State Sls	214-669-8567
TX	Houston, Quad State Sls	713-893-8585
TX	Plano, QSI (Central Sls Off)	214-516-0488
UT	Salt Lake City, Western Region Mktg., Inc.	801-268-9768
WA	Kirkland, ES/Chase Co Inc	206-823-9535
WI	Waukesha, Eagle Tech. Sls	414-968-2418
Can	Ont., Brampton, Cantec Toronto	416-791-5922
Can	Ont., Ottawa, Cantec Ottawa	613-725-3704
Can	Que., St. Eustache, Cantec Montreal	514-623-5496
Intl	Australia, Victoria, Veltek Pty. Ltd.	011-61-3-8087511
Intl	Austria, Wien, Steiner	011-43-222-877-7474-0
Intl	Belgium, Kontich, Alcom	03-458-30-33
Intl	Bulgaria, Sofia, Macro Group Branch	011-35-92325537
Intl	Czech Republic, Praha, Macro Weil Spol	011-42-23112182
Intl	Denmark, Bronby, Ditz Schweitzer	011-45-424-53044
Intl	Finland, Espoo, Bexab Finn-Crimp	011-935-805023200
Intl	France, Lissieu Hymelec Comps	011-33-78476810
Intl	Germany, Munich, Tekelec	011-49-89-51640
Intl	Holland, Capelle a/d Ijssel, Alcom	31-0-10-451-95-33
Intl	Hong Kong, Kowloon, Comex	011-852-7350325
Intl	Hungary, Budapest, Macro Info Srvc	011-36-11868033
Intl	India, Bangalor, Micronics	011-91-812-600631
Intl	Israel, Givataim, Eldis Technigs Ltd.	011-972-571-0222
Intl	Italy, Biassono, Dimac	039491514-2494856
Intl	Italy, Milan, Comprel Rep SS.R.L.	011-39-2-61290072
Intl	Japan, Chuo-Ku, Tokyo, Kanematsu Semi Corp	011-2-3551-7791
Intl	Korea, Seoul, Kortronics	011-822-523-5233
Intl	Norway, Lillestroem, Bexab Norge	011-47-63831455
Intl	Poland, Jagiellonska, Macropol Co Ltd	011-48-22112933
Intl	Singapore, Scan Technlg	011-65-294-2112
Intl	Slovak Republic, Zilina, Macro Zilina	011-42-8934181
Intl	Sweden, Taby, Keltech A.B.	011-46-86308590
Intl	Switzerland, Zurich, Ellyptic	011-411-493-1000
Intl	Taiwan ROC Taipei, Qumac	011-886-2-71-3178
Intl	Taiwan, Taipei, Jet-Lit Interprise	011-886-2-737-4200
Intl	Taiwan, Taipei ROC, Weiking	011-886-2-6590303
Intl	U.K.,England, Silicon Concepts Ltd	011-44-0428-751-617

Distributors

AL	Huntsville, Nu Horizons	205-722-9330
AL	Huntsville, Arrow Elctrns	205-837-6955
AZ	Tempe, Arrow Elctrns	602-431-0030
CA	Calabasas, Arrow Elctrns	818-880-9686
CA	Carlsbad, Aegis Elctrn Grp.	619-729-2026
CA	Fountain Valley, Bell Micro Prods Inc.	714-963-0667
CA	Fremont, Arrow Elctrns	510-490-9477
CA	Hayward, Arrow Elctrns	510-487-8416
CA	Irvine, Arrow Elctrns	714-587-0404
CA	San Diego, Arrow Elctrns	619-565-4800
CA	San Jose, Arrow Elctrns	408-441-9700
CA	San Jose, Arrow Elctrns	408-428-6400
CA	San Jose, Bell Micro Prods Inc	408-451-9400
CA	San Jose, Zeus Elctrns	408-629-4789
CA	Westlake Village, Bell Micro Prods Inc	805-496-2606
CA	Yorba Linda, Zeus Elctrns	714-921-9000
CO	Englewood, Arrow Elctrns	303-799-0258
CT	Wallingford, Arrow Elctrns	203-265-7741
FL	Altamonte Springs, Zeus Elctrns	407-831-8008
FL	Deerfield, Arrow Elctrns	305-429-8200
FL	Ft. Lauderdale, Nu Horizons	305-735-2555
FL	Lake Mary, Arrow Elctrns	407-333-9300
GA	Duluth, Arrow Elctrns	404-497-1300
GA	Norcross, Nu Horizons	404-416-8866
IL	Itasca, Arrow Elctrns	708-250-0500
IN	Indianapolis, Arrow Elctrns	317-299-2071
IA	Cedar Rapids, Arrow Elctrns	319-395-7230
KS	Lenexa, Arrow Elctrns	913-541-9542
MD	Columbia, Nu Horizons	410-995-6330
MD	Columbia, Arrow Elctrns	301-596-7800
MD	Gaithersburg, Arrow Elctrns	301-670-1600
MA	Wakefield, Nu Horizons	617-248-4442
MA	Wilmington, Bell MicroProducts, Inc.	508-658-0222
MA	Wilmington, Arrow Elctrns	508-658-0900
MI	Livonia, Arrow Elctrns	313-462-2290
MN	Eden Prairie, Arrow Elctrns	612-941-5280
MO	St. Louis, Arrow Elctrns	314-567-6888
NJ	Holmdel, Arrow Elctrns	908-949-4700
NJ	Marlton, Nu Horizons	609-596-1833
NJ	Marlton, Arrow Elctrns	609-596-8000
NJ	Pine Brook, Arrow Elctrns	201-227-7880
NJ	Pine Brook, Nu-Horizons	201-882-8300
NY	Amityville, Nu Horizons	516-226-6000
NY	Amityville, Nu-Horizons	516-226-6000
NY	Hauppauge, Arrow Elctrns	516-231-2500
NY	Melville, Arrow Elctrns	516-391-1300
NY	Port Chester, Zeus Elctrns	914-937-7400
NY	Rochester, Arrow Elctrns	716-427-0300
NY	Rochester, Nu-Horizons	716-292-0777
NY	Ronkonkoma, Arrow Elctrns	516-467-1000
NC	Raleigh, Arrow Elctrns	919-876-3132
OH	Centerville, Arrow Elctrns	513-435-5563
OH	Solon, Arrow Elctrns	216-248-3990
OK	Tulsa, Arrow Elctrns	918-252-7537
OR	Beaverton, Arrow Elctrns	503-629-8090
PA	Pittsburg, Arrow Elctrns	412-963-6807
TX	Austin, Arrow Elctrns	512-835-4180
TX	Carrollton, Arrow Elctrns	214-380-6464
TX	Houston, Arrow Elctrns	713-530-4700
UT	Salt Lake City, Arrow Elctrns	801-973-6913
WA	Bellevue, Arrow Elctrns	206-643-9992
WI	Brookfield, Arrow Elctrns	414-792-0150
Can	B.C., Burnaby, Arrow Elctrns	604-421-3132
Can	B.C., Burnaby, Arrow Elctrns	604-421-3132
Can	Ont., Mississauga, Arrow Elctrns	416-670-7769
Can	Ont., Nepean, Arrow Elctrns	613-226-6903
Can	Que., Dorval, Arrow Elctrns	514-421-7411

QUICKLOGIC CORP, 2933 Bunker Hill Lane, Santa Clara, California 95054, Tel: 408-987-2000, FAX: 408-987-2012

Sales Office & Representatives

AZ	Tempe, Altek Comps, Inc	602-345-4575
AZ	Tucson, Altek Comps, Inc	602-529-0443
CA	Manhattan Beach, QuickLogic (Southwest)	310-546-5589
CA	Newport Beach, Leading Concept Technlg	714-851-0654
CA	San Diego, Littlefield & Smith Assoc	619-455-0055
CA	San Jose, EXIS	408-456-1650
CA	Santa Clara, QuickLogic (Northwest)	408-987-2000
CO	Denver, Seale Assocs	303-695-1980
FL	Deerfield Bch, Delmac Sls, Inc	305-427-7788
FL	Longwood, Delmac Sls, Inc	407-831-0040
FL	Tampa, Delmac Sls, Inc	813-447-5192
ID	Ketchum, Quad Rep Crown,Inc	208-622-8125
MD	Glen Burnie, Tri-Mark,Inc	410-761-6000
MA	Westboro, QuickLogic (East)	508-366-1666
MA	Westford, Nashoba Grp	508-692-7503
MN	Minneapolis, Electrn Comp Sls	612-933-2594
NJ	Fairfield, MetroLogic Corp	201-575-5585
NY	Buffalo, Quality Comps,Inc	716-837-5430
NY	Manlius, Quality Comps,Inc	315-682-8885
OK	Tulsa, Nova Mktg,Inc	918-660-5105
OR	Portland, Quad Rep Crown, Inc	503-620-8320
PA	Plymouth Meeting, CMS Mktg	215-834-6840
TX	Austin, Nova Mktg, Inc	512-343-2321
TX	Dallas, Nova Mktg,Inc	214-750-6082
TX	Houston, Nova Mktg,Inc	713-988-6082
WA	Bellevue, Quad Rep Crown, Inc	206-453-5100
Can	Ont., Brampton, Electrn Sls Professionals	416-458-1103
Can	Ont., Ottawa, Electrn Sls Professionals	613-567-8547
Can	Ont., Scarborough, Electrn Sls Professionals	416-321-9693
Can	Que., St. Sauveur, Electrn Sls Professionals	514-227-2630
Intl	France, Cesson Sevigne, Avnet Scientech	33-99-83-98-98
Intl	France, Labege Cedex, Avnet Scientech	33-61-39-19-77
Intl	France, Merignac, Avnet Scientech	33-56-34-03-07
Intl	France, Saint-Etienne, Avnet Scientech	33-77-79-79-70
Intl	Germany, Hannover, Topas Electrn GmbH	49-5-11-13-12-17
Intl	Germany, Kircheim/Teck, Scantec Mikroelektronik GmbH	49-70-21-830-94
Intl	Germany, Planegg, Scantec Mikroelektronik GmbH	49-89-859-80-21
Intl	Germany, Quickborn, Topas Electrn GmbH	49-4106-73097
Intl	Italy, Bologna, Claitron Bologna	39-51-534883
Intl	Italy, Collegno, Claitron Torino	39-11-45054100
Intl	Italy, Milano, Claitron S.p.A.	39-2-33404000
Intl	Italy, Padova, Claitron Padova	39-49-665636
Intl	Italy, Prato, Claitron Firenze	39-574-590888
Intl	Italy, Roma, Claitron Roma	39-6-5413279
Intl	Japan, Tokyo, Nippon QuickLogic k.k.	03-5716-5930
Intl	U.K., England, Newbury Berks, Abacus Elctrns Holdings Ltd	44-0-635-515701

Distributors

AL	Huntsville, Hall-Mark Elctrns	205-837-8700
AZ	Phoenix, Hall-Mark Elctrns	602-437-1200
CA	Chatsworth, Hall-Mark Elctrns	818-773-4500
CA	Fountain Valley, Bell Microproducts	714-963-0667
CA	Irvine, Hall-Mark Elctrns	714-727-6000
CA	Rocklin, Hall-Mark Elctrns	916-624-9781
CA	San Diego, Hall-Mark Elctrns	619-268-1201
CA	San Jose, Bell Microproducts	408-451-9400
CA	San Jose, Hall-Mark Elctrns	408-432-4000
CO	Englewood, Hall-Mark Elctrns	303-790-1662
CT	Chesire, Hall-Mark Elctrns	203-271-2844
FL	Casselberry, Hall-Mark Elctrns	407-830-5855
FL	Largo, Hall-Mark Elctrns	813-541-7440
FL	Pompano Beach, Hall-Mark Elctrns	305-971-9280
GA	Duluth, Hall-Mark Elctrns	404-623-4400
IL	Wood Dale, Hall-Mark Elctrns	708-860-3800
IN	Indianapolis, Hall-Mark Elctrns	317-872-8875
KS	Lenexa, Hall-Mark Elctrns	913-888-4747
MD	Columbia, Hall-Mark Elctrns	301-988-9800
MA	Billerica, Hall-Mark Elctrns	508-667-0902
MI	Plymouth, Hall-Mark Elctrns	313-416-5800
MN	Bloomington, Hall-Mark Elctrns	612-881-2600
MO	Earth City, Hall-Mark Elctrns	314-291-5350
NJ	Moorestown, Hall-Mark Elctrns	609-235-1900
NJ	Parisppany, Hall-Mark Elctrns	201-515-3000
NY	Fairport, Hall-Mark Elctrns	716-425-3300
NY	Ronkonkoma, Hall-Mark Elctrns	516-737-0600
NC	Raleigh, Hall-Mark Elctrns	919-872-1900
OH	Solon, Hall-Mark Elctrns	216-349-4632
OH	Worthington, Hall-Mark Elctrns	614-888-3313
OK	Tulsa, Hall-Mark Elctrns	918-254-6110
TX	Austin, Hall-Mark Elctrns	512-258-8848
TX	Dallas, Hall-Mark Elctrns	214-343-5000
TX	Dallas, Hall-Mark Elctrns	214-553-4300
TX	Houston, Hall-Mark Elctrns	713-781-6100
WA	Seattle, Hall-Mark Elctrns	206-547-0415
WI	New Berlin, Hall-Mark Elctrns	414-797-7844
Can	Ont., Brampton, Electrn Sls Professionals	416-458-1103
Can	Ont., Ottawa, Electrn Sls Professionals	613-567-8547
Can	Ont., Scarborough, Electrn Sls Professionals	416-321-9693
Can	Que., St. Sauveur, Electrn Sls Professionals	514-227-2630
Intl	France, Cesson Sevigne, Avnet Scientech	33-99-83-98-98
Intl	France, Labege Cedex, Avnet Scientech	33-61-39-19-77
Intl	France, Merignac, Avnet Scientech	33-56-34-03-07
Intl	France, Saint Etienne, Avnet Scientech	33-77-79-79-70
Intl	Germany, Hannover, Topas Electrn GmbH	49-5-11-13-12-17
Intl	Germany, Kircheim/Teck, Scantec Mikroelektronik GmbH	49-70-21-830-94

Intl	Germany, Planegg, Scantec Mikroelektronik GmbH	49-89-859-80-21
Intl	Germany, Quickborn, Topas Electrn GmbH	49-4106-73097
Intl	Italy, Bologna, Claitron Bologna	39-51-534883
Intl	Italy, Collegno, Claitron Torino	39-11-4054100
Intl	Italy, Milano, Claitron S.p.A.	39-2-33404000
Intl	Italy, Padova, Claitron Padova	39-49-665636
Intl	Italy, Prato, Claitron Firenze	39-574-590888
Intl	Italy, Roma, Claitron Roma	39-6-5413279
Intl	Japan, Tokyo, Nippon QuickLogic k.k.	03-5716-5930
Intl	U.K., England, Newbury Berks, Abacus Elctrns Holding Ltd	44-0-635-515701

R&E INTERNATIONAL, INC, 210 Goddard Blvd, Suite 100, King of Prussia, Pennsylvania 19406, Tel: 215-992-0727, FAX: 215-992-0734

Sales Office & Representatives

CT	Torrington, Phoenix Sls	203-496-7709
FL	Boca Raton, Tech Sls Specialists	407-391-3718
NY	Babylon, Astrorep Inc	516-422-2500
PA	Southampton, Campbell Assocs	215-322-6630
Intl	Germany, Hinterzarten, SSG Halbleiter Vertriebs GmbH	07652 1065-66

Distributors

DE	New Castle, Electrns Exchange	302-322-5401
FL	Ft. Lauderdale, Universal Semi	305-972-8111
MA	Norwood, Emtel Elctrns	617-769-9500
MN	Caledonia, K-V Elctrns	507-724-3322
NJ	Linden, Thor Elctrns	908-486-3300
NJ	Teaneck, Summit Radio Corp	201-837-3644
NY	Hauppauge, Denelex Comps	516-434-6900
OH	Eastlake, Major Elctrns	216-942-0054
OH	Warren, REM Elctrns	216-373-1300
PA	Levittown, AIM Elctrns, Inc	215-946-3900
Intl	Germany, Solingen, Neutron CAD SOFT Inds GmbH	0212-444-43

RAMTRON CORPORATION, 1850 Ramtron Drive, Colorado Springs, Colorado 80921, Tel: 719-481-7000, FAX: 719-488-9095

Sales Office & Representatives

AL	Huntsville, Elctrn Mktg Assocs	205-880-8050
AL	Huntsville, Nu Horizons	205-722-9330
AZ	Carefree, Hi-Tech Sls Co	602-254-9778
CA	Orange, Prism Assoc	714-283-8744
CA	San Diego, Prism Assocs	619-597-7502
CA	Santa Clara, Phase II Tech Sales	408-980-0414
CA	Van Nuys, Prism Assocs	818-375-5065
CO	Littleton, Lange Sales, Inc.	303-795-3600
CT	Nu Horizons	203-265-0162
FL	Ft. Luaderdale, Nu Horizons	305-735-2555
GA	Atlanta, Elctrn Mktg Assocs	404-448-1215
GA	Norcross, Nu Horizons	404-416-8666
ID	Boise, Lange Sls Inc	208-323-0713
IL	Elk Grove Village, Oasis Sls	708-640-1850
IA	Cedar Rapids, Oasis Sales	319-377-8738
ME	Westford, The Nashoba Grp	508-692-7503
MD	Columbia, Nu Horizons	301-995-6330
MA	Wakefield, Nu Horizons	617-246-4442
MN	Bloomington, Oasis Sales	612-941-1917
NJ	Ft. Lee, Nexus Sales	201-947-0151
NJ	Marlton, Nu Horizons	609-596-1833
NJ	Pine Brook, Nu Horizons	201-882-8300
NM	Albuquerque, Nelco Electronix	505-293-1399
NY	Amityville, Nu Horizons	516-226-6000
NY	Fairport, Tech Mktg Resources	716-223-4235
NY	Rochester, Nu Horizons	716-292-0777
NY	Syracuse, Tech Mktg Resources	315-476-2420
NC	Raleigh, Elctrns Mktg Assocs	919-847-8800
OR	Beaverton, Elctrn Sources, Inc	503-627-0838
PA	Horsham, Nexus Sales	215-675-9600
TX	Austin, M Rep	512-250-0828
TX	Dallas, M Rep	214-484-5711
UT	Salt Lake City, Lange Sls Inc	801-487-0843
VA	Front Royal, Elctrn Sls Ltd	703-635-7201
VA	Herndon, Elctron Sls Ltd	703-648-3810
VA	Roanoke, Eltron Sls Ltd	703-366-7248
VA	Virginia Bch, Elctron Sls Ltd	804-721-3915
WA	Bellevue, Elctrn Sls Ltd	206-451-3500
WI	Brookfield, Oasis Sls	414-782-6660
Intl	Australia, Sydney, Intaq Intl Pty. Ltd.	61-02-252-4055
Intl	England, Sevenoaks, Kent, Mogul Electrns	44-732-741841
Intl	France, Massy, A2M	33-1-39-54-91-13
Intl	Germany, Martinsried, Atlantik Electronik GmbH	49-89-85-70-00-0
Intl	Isreal, Tel Aviv, Startronics Ltd	972-3-265231
Intl	Italy, Milano, Skylab srl	39-2-667-10-822
Intl	Japan, Kawasaki-shi,Kanagawa, CTC Comps Sys Co. Ltd.	81-44-852-5121
Intl	Japan, Tokyo, Chiyoda-Ku, Sys Mktg, Inc.	81-3-3254-2751
Intl	Netherlands, Amsterdam, Nijkerk Electronika B.V.	31-20-549-5969
Intl	Singapore, Serial System Pte Ltd	65-2800200
Intl	Sweden, Taby, Bexab Technlg AB	46-8-630-88-00
Intl	Taiwan, Taipei ROC, Promate Elctrn Co Ltd	886-2-7763512
Intl	U.K., Clifton, Bristol, Applied Mktg & Technlg	44-272-237-594

RAYTHEON COMPANY, Semiconductor Division, 350 Ellis Street, Mountain View, California 94039-7016, Tel: 415-968-9211, TWX: 910-379-6484, FAX: 415-962-7971

Sales Office & Representatives

AL	Huntsville, EMA	205-830-4030, 800-633-2920
AL	Huntsville, District Sls Off	205-880-7122
AZ	Tempe, Semper Fi Sls Co.	602-730-9553
CA	Irvine, Raytheon Rgn Sls Off	714-830-2808
CA	Mission Viejo, Petra Prods., Inc	714-768-0491
CA	San Jose, Quadrep, Inc	408-432-3300
CA	Sunnyvale, Raytheon Rgn Sls Off	408-522-7072
CA	Woodland Hills, Oliart Enterprises	818-716-9747
CO	Denver, Seale & Assocs	303-695-1980
CT	Guilford, Data Mark, Inc.	203-453-0575
FL	Alamonte Springs, Raytheon Rgn Sls Off	407-339-4820
FL	Oviedo, Conley Assocs, Inc.	407-365-3283
GA	Roswell, EMA	404-992-7240, 800-647-3773
IL	Des Plaines, Raytheon Rgn Sls Off	708-297-5540
IL	Hoffman Estates, Victory Sls, Inc	708-490-0300
IN	Indianapolis, Precision Elec. Comps	317-842-3740
MD	Columbia, Delta III Assocs., Inc	301-730-4700
MA	Burlington, Anacon Sls. Assoc., Inc.	617-272-9080
MA	Lexington, Raytheon Rgn Sls Off	617-860-4010
MN	Eden Prairie, Aldridge Assoc. Inc.	612-944-8433
MO	Bridgeton, H.C.I.	314-291-5920
MO	Independence, H.C.I.	816-796-6684
NY	Commack, ERA, Inc	516-543-0510
NY	Hauppauge, Raytheon Rgn Sls Off	516-582-3646
NY	Syracuse, Pi'Tronics, Inc.	315-455-7346
NC	Raleigh, E M A	919-846-6888
OH	Beachwood, Electrn Salesmasters Inc.	216-831-9555
OH	Dayton, Raytheon District Off	513-293-1888
OR	Portland, ES/Chase Co., Inc.	503-292-8840
PA	Berwyn, Raytheon District Off	215-640-4057
TX	Farmers Branch, Raytheon District Off	214-484-5882
TX	Richardson, Interactive Comps Sls	214-669-2277
WA	Kirkland, ES/Chase Co., Inc.	206-823-9535
WI	Milwaukee, Carlson Elctrns Sls	414-476-2790
Can	Ontario, Brampton, Cantec Reps. Inc.	416-791-5922
Can	Ontario, Ottawa, Cantec Reps. Inc.	613-725-3704
Can	Quebec, Ste. Eustache, Cantec Reps. Inc.	514-623-5496
Intl	France, Cedex, Raytheon Semi France	33-1-46310676
Intl	Germany, Munchen, Raytheon Halbleiter GmbH	49-89-5309930
Intl	Japan, Tokyo, Raytheon Semi Int'l. Co.	81-33-280-4776
Intl	U.K., Andover Hants, Raytheon Semi Intl	44-264-334616
PR	San Juan, P.C. Elctrns, Inc.	809-753-9805

Distributors

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CA	Calabasas, Arrow/Schweber Elctrns	818-880-9686
CA	Fremont, Arrow Pacific	510-490-9477
CA	Irvine, Arrow/Schweber Elctrns	714-587-0404
CA	San Diego, Arrow/Schweber Elctrns	619-565-4800
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CA	San Jose, All American Semi	408-943-1200, 800-222-6001
CA	San Jose, Zeus Comps Inc.	408-629-4789, 800-366-8360
CA	San Jose, Arrow/Schweber Elctrns	408-441-9700
CA	Torrance, All American Semi	310-320-0240
CA	Walnut, ACI Elctrns	714-594-1731
CA	Yorba Linda, Zeus Comps., Inc.	714-921-9000
CO	Englewood, Arrow/Schweber Elctrns	303-799-0258
CT	Wallingford, Arrow/Schweber Elctrns	203-265-7741
FL	Altamonte Springs, Zeus Comps	407-788-9100
FL	Deerfield Bch, Arrow/Schweber Elctrns	305-429-8200
FL	Lake Mary, Arrow/Schweber Elctrns	407-333-9300
FL	Miami, All American Semi	305-621-8282
FL	Sunrise, All American Semi	305-572-7999, 800-327-6237
GA	Duluth, Arrow/Schweber Elctrns	404-497-1300
IL	Itasca, Arrow/Schweber Elctrns	708-250-0500
IN	Indianapolis, Arrow/Schweber Elctrns	317-299-2071
IA	Cedar Rapids, Arrow/Schweber Elctrns	319-395-7230
KS	Lenexa, Arrow/Schweber Elctrns	913-541-9542
MD	Columbia, Zeus Comps	301-997-1118
MD	Columbia, Arrow/Schweber Elctrns	301-596-7800
MA	Wakefield, Zeus New England	617-246-8200
MA	Wakefield, All American Semi	617-246-2300
MA	Willmington, Arrow/Schweber Elctrns	508-658-0900
MA	Woburn, ACI	617-935-7230
MI	Livonia, Arrow/Schweber Elctrns	313-462-2290
MN	Eden Prairie, Arrow/Schweber Elctrns	612-941-5280
MO	St. Louis, Arrow/Schweber Elctrns	314-567-6888
NJ	Clifton, Vantage Comps Inc.	201-777-4100
NJ	Marlton, Arrow/Schweber Elctrns	609-596-8000
NJ	Pine Brook, Arrow/Schweber Elctrns	201-227-7880
NY	Hauppauge, Arrow/Schweber Elctrns	516-231-1000
NY	Melville, Arrow/Schweber Elctrns	516-391-1300
NY	Plainview, ACI Elctrns	516-293-6630, 800-645-4955
NY	Port Chester, Zeus Comps., Inc.	914-937-7400
NY	Rochester, Arrow/Schweber Elctrns	716-427-0300
NY	Ronkonkoma, All American Semi	800-874-2830, 516-981-3935
NY	Ronkonkoma, Zeus Comps, Inc	516-737-4500
NC	Raleigh, Arrow/Schweber Elctrns	919-876-3132
OH	Centerville, Arrow/Schweber Elctrns	513-435-5563
OH	Solon, Arrow/Schweber Elctrns	216-248-3990
OK	Tulsa, Arrow/Schweber Elctrns	918-252-7537
OR	Beaverton, Almac/Arrow Elctrns	503-629-8090
PA	Pittsburgh, Arrow/Schweber Elctrns	412-963-6807
TX	Austin, MINCO Tech. Lab	512-834-2022
TX	Austin, Arrow/Schweber Elctrns	512-835-4180
TX	Carrollton, Arrow/Schweber Elctrns	214-380-6464
TX	Houston, Arrow/Schweber Elctrns	713-530-4700
TX	Richardson, Zeus Comps	214-783-7010
TX	Richardson, All American Semi	214-231-5300, 800-541-1435
UT	Salt Lake City, Arrow/Schweber Elctrns	801-973-6913
WA	Bellevue, Almac/Arrow Elctrns	206-643-9992
WA	Spokane, Almac/Arrow Elctrns	509-924-9500
WI	Brookfield, Arrow/Schweber Elctrns	414-792-0150
Can	B.C., Burnaby, Arrow/Canada	604-421-2333
Can	Ont., Mississauga, Arrow/Canada	416-670-7769
Can	Ont., Mississauga, Future Elctrns	416-612-9200
Can	Ont., Nepean, Arrow/Canada	613-226-6903
Can	Ont., Ottawa, Future Elctrns	613-820-8313
Can	Que., Dorval, Arrow/Canada	514-421-7411

Can	Que., Pointe Claire, Future Elctrns	514-694-7710
Can	Quebec, Arrow/Canada	418-871-7500

RCA, See Harris Semiconductor

RICOH CORPORATION, Electronic Devices, 3001 Orchard Park Way, San Jose, California 95134, Tel: 408-432-8800, 408-944-3303

RIFA, INC., See Ericsson Components

ROCHESTER ELECTRONICS INCORPORATED, 10 Malcolm Hoyt Drive, Newburyport, Massachusettes 01950, Tel: 508-462-9332, TELEX: 759499, FAX: 508-462-9512

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AL	Huntsville, Macro Mktg Assoc, Inc	205-883-9630
AZ	Phoenix, J.F. Hurlbut Co	602-952-2079
CA	Manteca, R.E.I.	209-825-4517
CA	Mission Viejo, Angle Assocs	714-582-8858
CA	San Diego, Angle Assocs	619-581-2211
CA	San Jose, TechRep	408-261-8287
CA	Torrence, Angle Assocs	310-327-3852
CO	Golden, J.F. Hurlbut Co	303-279-7796
GA	Marietta, Macro Mktg. Assoc., Inc	404-971-4145
IA	Davenport, Rush & West Assocs., Inc	319-388-9494
KS	Olathe, Rush & West Assocs., Inc	913-764-2700
MD	Towson, Adv. Tech. Sales, Inc	410-296-9360
MA	Wayland, Belmont Group Intl	508-358-5973
MN	Minneapolis, Comstrand, Inc	612-574-9480
MO	St. Louis, Rush & West Assocs., Inc	314-965-3322
NY	Pittsford, James E. Zimmerman Sls., Inc	716-381-3186
PA	Blue Bell, Deltatronics, Inc	215-641-9930
TX	Houston, Kite Elec. Sls, Inc	713-738-5258
TX	Irving, Kite Elec. Sls, Inc	214-986-0321
VA	Richmond, Adv. Tech. Sales, Inc	804-320-8756
Intl	India, Capricorn Sys. Inc	91-80-642-295
Intl	United Kingdom, REI/European Sales Off	0582-603439

ROCKWELL INTERNATIONAL, Digital Communications Div., 4311 Jamboree Rd., P.O. Box C, Newport Beach, California 92658-8902, Tel: 714-833-4600, FAX: 714-833-4078

ROHM CORPORATION, 3034 Owen Drive, Antioch, Tennessee 37013, Tel: 615-641-2020, FAX: 615-641-2022

Sales Office & Representatives

AL	Huntsville, Strategic Mktg	205-464-0490
AZ	Tucson, R.J. Mktg	602-770-1783
CA	Camarillo, Eltec Enterprises	805-484-8298
CA	Carlsbad, Eltec Enterprises	714-492-6226
CA	Dana Point, Eltec Enterprises	714-493-7003
CA	Diamond Bar, Eltec Enterprises	909-861-4779
CA	San Jose, Rohm Corp	408-432-0500
CA	Santa Clara, Technology Sls. Inc	408-727-7200
CO	Parker, A5 Company	303-841-3651
FL	Plant City, Strategic Mktg	813-754-1329
FL	Seminole, Strategic Mktg	813-392-0134
GA	Alpharetta, Strategic Mktg	404-667-1308
IL	Lake Bluff, Hopewell Assocs	708-234-3310
IN	Kokomo, Schillinger Assocs., Inc.	317-457-7241
MA	Harvard, Cycle Sls	508-456-6868
MN	Lakeville, Hopewell Assocs	612-469-3222
NJ	Springfield, Radix, Inc.	201-467-4970
NY	Buffalo, Quality Comps, Inc	716-837-5430
NY	Manlius, Quality Comps, Inc.	315-682-8885
NY	Rochester, Quality Comps, Inc	716-342-7229
NC	Raleigh, Strategic Mktg	919-847-7972
OR	Beaverton, Comps West, Inc.	503-642-9110
PA	Prospect Park, ELF Sales Co.	215-534-3340
TN	Antioch, Rohm Elctrns	615-641-2020
TN	Nashville, Strategic Mktg	615-883-7882
TX	Austin, Sage Mktg	512-335-0300
TX	Spring, Sage Mktg	713-320-9206
WA	Redmond, Comps West, Inc.	206-885-5880
Can	Ont., Hamilton, Cartwright-Southall Assocs	416-528-0294
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Intl	Brazil, Sao Paulo, Rohm Industria Electrna Ltda.	421-4577
Intl	Germany, Korschenbroich, Rohm Electrns GmbH	02161 61010
Intl	Hong Kong, Kowloon, Rohm Electroics H.K. Co. Ltd.	3756262
Intl	Japan, Aichi, Chita Electrn Industrial Co.Ltd.	05694-2-3113
Intl	Japan, Fukuoka, Apollo Electrns Co. Ltd.	0942-53-6111
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Intl	Japan, Fukuoka, Rohm Amagi Co Ltd.	0946 23 0021
Intl	Japan, Hyogo, Narita Giken Co. Ltd.	06-433-0410
Intl	Japan, Kyoto, Rohm Mechatech Co. Ltd.	07712-5-4717
Intl	Japan, Kyoto, Uemura Giken Co. Ltd.	075-315-2016
Intl	Japan, Kyoto, Mebius Co. Ltd	075-255-4676
Intl	Japan, Okayama, Wako Elec Co Ltd.	08656-7-0111
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Intl	Japan, Okayama, Rohm Distribution Center Co Ltd.	086544-3181
Intl	Japan, Yamanashi, Rohm Fuji Co. Ltd.	0555-24-2751
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Intl	Korea, Seoul, Rohm Korea Corp.	855-70101/4
Intl	Malaysia, Rohm-Wako Kelantan SDN BHD	09-735500
Intl	Malaysia, Darul Ebsan, Rohm-Wako Malaysia SDN BHD	03-511-1313
Intl	Philippines, Carmona Cavite, Rohm Electrns Philippines, Inc.	90-201-4187
Intl	Singapore, Rohm Electrns Co. Singapore Pte. Ltd.	745-9326/7
Intl	Singapore, Rohm Electrns Intl Pte Ltd	444-3488
Intl	Taiwan, ROC Taipei, Rohm Electrns Taiwan Co. Ltd.	02-500-6956/7
Intl	Thailand, Bangkok, Rohm Apollo Electrns Thailand Co. Ltd.	02-529-0777-82
Intl	United Kingdom, Milton Keynes, Rohm Electrns UK Limited	0908 271311
PR	Sales Engnr Concepts	809-250-0140 X5321

Distributors

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AZ	Phoenix, Sterling Elctrns	602-437-5565
AZ	Scottsdale, Kent/Shelley-Ragon	602-998-0399
AZ	Tempe, Bell Inds	602-966-3600
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CA	Agoura Hills, Bell Inds	818-879-9492
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CA	Costa Mesa, Eric Elctrns	714-751-1185
CA	Cypress, Bell Inds	714-895-7801
CA	Fremont, Acacia/Deanco	510-623-7500
CA	Gilroy, Mouser Elctrns	800-346-6873
CA	Industry, Ital Elctrn Sls	818-968-8515
CA	Irvine, Acacia/Deanco	714-660-0834
CA	Irvine, Kelex Elctrns	714-863-1230
CA	Irvine, Integrated Elctrns	714-753-0127
CA	Irvine, Sterling Elctrns	714-453-7660
CA	Los Angeles, Bell Inds	310-825-2355
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CA	Milpitas, Projections Unlimited	408-942-1717
CA	Rocklin, Bell Inds	916-652-0418
CA	Sacramento, Integrated Elctrns	916-363-6030
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CA	San Diego, Kent/Shelley-Ragon	619-453-7133
CA	San Diego, Sterling Elctrns	619-560-8097
CA	San Diego, Bell Inds	619-268-1277
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CA	San Diego, All American	619-458-5850
CA	San Diego, Projections Unlimited	619-453-8444
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CA	San Jose, Eric Elctrns	408-432-1111
CA	San Jose, Jaco Elctrns	408-432-9290
CA	San Jose, All American	408-943-1200
CA	Santa Maria, Garrett IEU	805-922-0594
CA	Santee, Mouser Elctrns	619-449-2222
CA	Sunnyvale, PSC Elctrns	408-373-1333
CA	Sunnyvale, Bell Inds	408-734-8570
CA	Torrance, All American	310-320-0240
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CA	Tustin, Projections Unlimited	714-544-2700
CA	Westlake Village, JACO Elctrns	805-495-9998
CA	Westlake Village, Sterling Elctrns	818-865-2333
CO	Colorado Springs, I.E.C.	719-596-4284
CO	Denver, Integrated Elctrns	313-292-6121
CO	Denver, Bell Inds	303-691-9010
CO	Englewood, Sterling Elctrns	303-792-3939
CO	Englewood, Kent/Shelley-Ragon	303-792-9100
CO	Erie, JACO Elctrns	303-828-3074
CO	Wheat Ridge, Acacia/Deanco	303-421-7004
CT	Berlin, Kent/Shelley-Ragon	203-829-2100
CT	Meriden, Bell Inds	203-629-6000
CT	Wallingford, Cronin Elctrns	203-265-3134
CT	Wallingford, Sterling Elctrns	203-265-9535
FL	Altamonte Springs, Bell Inds	407-339-0078
FL	Coral Springs, JACO Elctrns	305-341-8280
FL	Ft. Lauderdale, Hammond Elctrns	305-973-7103
FL	Largo, Kent/Shelley-Ragon	813-545-0057
FL	Melbourne, Pridmore	407-727-2491
FL	Miami, All American	305-621-8282
FL	Orlando, Hammond Elctrns	407-849-6060
FL	Sunrise, All American	305-572-7999
GA	Athens, Dixie Elctrns	404-613-7755
GA	Atlanta, Bell Inds	404-446-7167
GA	Norcross, Hammond Elctrns	404-449-1996
ID	Boise, Radar Elec	208-336-2227
IL	Elk Grove Village, Kent/Shelley-Ragon	708-364-1300
IL	Elk Grove Village, Bell Inds	708-640-1910
IL	Hoffman Estates, Integrated Elctrns	708-843-2040
IL	Palatine, OHM Elctrns	708-359-5500
IL	Rosemont, Advent Elctrns	708-297-6200
IL	Schaumburg, Sterling Elctrns	708-303-9900
IL	Woodale, NEP Elctrns	708-595-8500
IN	Ft. Wayne, Bell Inds	219-422-4300
IN	Indianapolis, Advent Elctrns	317-872-4910
IN	Indianapolis, Bell Inds	317-875-8200
IA	Cedar Rapids, Advent Elctrns	319-363-0221
IA	Cedar Rapids, Kent/Shelley-Ragon	319-373-0525
IA	Cedar Rapids, Dee Elctrns	319-365-7551
KS	Lenexa, Sterling Elctrns	913-492-5406
KS	Overland Park, Kent/Shelley-Ragon	913-338-4300
KY	Louisville, Peerless Elctrns	502-637-7674
LA	Westwego, Sterling Elctrns	504-436-1418
MD	Columbia, JACO Elctrns	410-995-6620
MD	Columbia, Sterling Elctrns	410-290-3800
MD	Columbia, Bell Inds	410-290-5100
MD	Columbia, Kent/Shelley-Ragon	410-720-6200
MD	Rockville, All American	301-251-1205
MA	Andover, Bell Inds	508-474-8880
MA	Chelmsford, Kent/Shelley-Ragon	508-250-9666
MA	Needham, Cronin Elctrns	617-449-5000
MA	Tewksbury, JACO Elctrns	508-640-0010
MA	Wakefield, All American	617-246-2300
MA	Woburn, Sterling Elctrns	617-938-6200
MI	Farmington Hills, Advent Elctrns	313-477-1650
MI	Farmington Hills, Key Elctrns	313-489-5455
MI	Grand Rapids, R.M. Elctrns	616-531-9300
MN	Eden Prairie, All American	612-944-2151
MN	Minneapolis, Sterling Elctrns	612-831-2666
MN	St. Paul, Kent/Shelley-Ragon	612-642-2828
NH	Hudson, Diamond Elctrns	603-894-4420
NH	Manchester, Cronin Elctrns	603-624-0105
NJ	Bloomfield, Solid State	201-429-8700
NJ	Denville, Kent/Shelley-Ragon	201-625-5500
NJ	Edison, Sterling Elctrns	908-417-1000
NJ	Fairfield, Bell Inds	201-227-6060
NJ	Mt. Laurel, Sterling Elctrns	609-273-6420
NJ	Randolph, Mouser Elctrns	201-328-3322
NJ	Rockaway, Tonar Elctrns	201-586-9000
NJ	West Berlin, General Comps	609-768-6767
NM	Albuquerque, Bell Inds	505-292-2700
NM	Albuquerque, Sterling Elctrns	505-884-1900
NY	E. Rochester, Rome Elctrns	716-248-0160
NY	Hauppauge, JACO Elctrns	516-273-5500
NY	Mt. Sinai, Kent/Shelley-Ragon	516-447-2000
NY	Penn Yan, Advacom	315-536-2221
NY	Rome, Rome Elctrns	315-337-5400
NY	Ronkonkoma, All American	516-981-3935
NY	Williamsville, Rome Elctrns	800-366-0118, 716-626-1602
NC	Charlotte, Dixie Elctrns	704-521-8682

NC	Greensboro, Hammond Elctrns	919-275-6391
NC	Raleigh, JACO Elctrns	919-876-7767
NC	Raleigh, Sterling Elctrns	919-790-8634
NC	Raleigh, Dixie Elctrns	919-829-0704
NC	Winston-Salem, Dixie Elctrns	919-724-5961
OH	Akron, Aesco Elctrns	216-762-8818
OH	Akron, All American	216-745-8890
OH	Cleveland, CAM/RPC	216-461-4700
OH	Dayton, Advacom Inc	513-274-5900
OH	Dayton, Bell Inds	513-435-5922
OH	Englewood, ADS Electra	513-836-8633
OH	Middlesburg, Advacom Inc	216-826-3300
OH	Solon, Repco Elctrns	216-248-8900
OH	Solon, Sterling Elctrns	216-248-1122
OH	Solon, Bell Inds	216-498-2002
OH	Westerville, Aesco Elctrns	614-882-6762
OH	Worthington, CAM/RPC	614-888-7777
OK	Tulsa, All American	918-438-6002
OK	Tulsa, Sterling Elctrns	918-663-2410
OR	Beaverton, Integrated Elctrns	503-641-1690
OR	Beaverton, Bell Inds	503-644-1500
OR	Beaverton, Acacia/Deanco	503-646-3377
OR	Beaverton, Kent/Shelley-Ragon	503-626-8300
OR	Portland, Radar Elec	503-232-3404
PA	Export, Advacom	412-325-7551
PA	Levittown, Aim Elctrns	215-946-3900
PA	Mc Kean, Advacom	814-476-7774
PA	Pittsburgh, CAM/RPC	412-963-6202
PA	Trevose, Bell Inds	215-953-2899
PA	York, Advacom Inc	717-741-9277
SC	Columbia, Dixie Elctrns	803-779-5332
SC	Greenville, Hammond Elctrns	803-233-4121
SC	Greenville, Dixie Elctrns	803-297-1430
SC	N. Charleston, Dixie Elctrns	803-552-2671
TN	Gray, Dixie Elctrns	615-477-2131
TN	Nashville, SMD Inc	615-331-6045
TN	Oakridge, Dixie Elctrns	615-481-3393
TX	Austin, JACO Elctrns	512-835-0220
TX	Austin, Sterling Elctrns	512-836-1341
TX	Austin, Kent/Shelley-Ragon	512-834-1900
TX	Carrollton, Sterling Elctrns	214-243-1600
TX	Ft. Worth, Tandy National Parts	817-870-5649
TX	Houston, Sterling Elctrns	713-627-9800
TX	Houston, Kent/Shelley-Ragon	713-780-7770
TX	Mansfield, Mouser Elctrns	817-483-0165
TX	N. Richland Hills, Dixie Elctrns	817-281-1811
TX	Richardson, JACO Elctrns	214-234-5565
TX	Richardson, All American	214-231-5300
TX	Richardson, Bell Inds	214-690-0482
TX	Richardson, Kent/Shelley-Ragon	214-669-2600
UT	Midvale, Bell Inds	801-255-9611
UT	Salt Lake City, Sterling Elctrns	801-972-5444
UT	Salt Lake City, All American	801-261-4210
UT	W. Valley City, Integrated Elctrns	801-977-9750
VA	Richmond, Sterling Elctrns	804-323-5510
WA	Bellevue, Integrated Elctrns	206-455-2727
WA	Redmond, Bell Inds	206-881-2140
WA	Redmond, Kent/Shelley-Ragon	206-883-7200
WA	Redmond, Acacia/Deanco	206-881-5566
WA	Redmond, Priebe Elctrns	206-881-2363
WA	Richland, Radar Elec	509-943-8336
WA	Seattle, Radar Elec	206-282-2511
WA	Spokane, Radar Elec	509-747-3053
WI	New Berlin, NEP Elctrns	414-785-9100
WI	Waukesha, Bell Inds	414-547-8879
WI	West Allis, Advent Elctrns	414-475-6800
Can	B.C., Surrey, Memco	604-590-1553
Can	Ont., Markham, Carsten Elctrns	416-477-7705
Can	Ont., Nepean, Carsten Elctrns	613-726-9250
Can	Que., St. Laurent, Carsten Elctrns	514-334-8321

S-MOS SYSTEMS, INC., 2460 North First Street,
San Jose, California 95131, Tel: 408-922-0200, FAX:
408-922-0238

Sales Office & Representatives

AL	Huntsville, Electrn Sales	205-533-1735
AZ	Scottsdale, American Mktg, Inc.	602-948-2778
CA	Laguna Hills, Advanced Concept Electrns	714-583-2525
CA	San Diego, Littlefield & Smith	619-455-0055
CA	San Jose, S-MOS Sys, Inc.	408-922-0200
CO	Denver, Alliance Electrns	303-433-1648
CT	Bethel, Future Electrns	203-743-9594
CT	Woodbury, Anacon Sales	203-266-0707
FL	Casselbury, Dyne-A-Mark Corp.	305-831-2822
FL	Clearwater, Dyne-A-Mark Corp.	813-441-4702
FL	Ft. Lauderdale, Dyne-A-Mark Corp.	305-771-6501
GA	Norcross, Electrn Sales, Inc.	404-448-6554
GA	Roswell, S-MOS Sys, Inc. (Southewast Regional Off.)	404-992-7731
IL	Naperville, S-MOS Sys,Inc (N. Central Regional Off.)	708-357-0010
IL	Northbrook, Dolin Sales Company	708-498-6770
IN	Indianapolis, Precision Electrns Comps	317-842-3740
IA	Marion, AEM, Inc.	319-377-1129
KS	Lenexa, AEM Inc.	913-888-0022
MD	Glen Burnie, Logical Technology	301-766-7444
MA	Burlington, Anacon Sales	617-272-9080
MA	Wakefield, S-MOS Sys, Inc. (Eastern Area)	617-246-3600
MI	Farmington Hills, Tritech Sales, Inc.	313-553-3370
MN	Eden Prairie, Electro-Mark	612-944-5850
MO	Brigeton, AEM, Inc.	314-298-9900
NY	Fayetteville, H.C. Johnson Agencies, Inc.	315-637-1143
NY	Rochester, H.C. Johnson Agencies, Inc.	716-586-0777
NY	Woodbury, Comp Consultants,Inc.	516-364-8020
NC	Cary, Electrn Sales, Inc.	919-467-8486
NC	Charlotte, Electrn Sales, Inc.	704-543-8705
NC	Raleigh, S-MOS Sys, Inc. (Southeast Area)	919-878-1120
OH	Dayton, The Lyons Corp.	513-278-0714
OH	Richfield, The Lyons Corp.	216-659-9224
OH	Westerville, The Lyons Corp.	614-895-1447
OR	Tigard, Electrn Comps Sales	503-245-2342
PA	Trevose, Omega Electrn Sales	215-244-4000
TX	Austin, Southwestern Tech Sales	512-258-6297
TX	Dallas, Southwestern Tech Sales	214-369-0977
TX	Houston, Southwestern Tech Sales	713-440-9200
WA	Mercer Island, Electrn Comp Sales	206-232-9301
WI	Glendale, Dolin Sales Company	414-482-1111
Can	British Columbia, Surry, Dynasty Comps	604-597-0068
Can	Ontario, Mississauga, Dynasty Comps	416-674-8060
Can	Ontario, Nepean, Dynasty Comps	613-723-0725
Can	Quebec, Pointe Claire, Dynasty Comps	514-694-0275
PR	San Juan, ETS, Inc.	809-798-1300

Distributors

AL	Huntsville, Schweber Electrns	205-895-0480
AZ	Phoenix, Future	602-968-7140
AZ	Tempe, Schweber Electrns	602-431-0030
CA	Agoura Hills, Western Micro	818-707-0377
CA	Calabasas, Schweber Electrns	818-880-9686
CA	Chatsworth, Future Electrns	818-700-0914
CA	Irvine, Schweber Electrns	714-863-0200
CA	Irvine, Future	714-250-4141
CA	Orange, Western Micro	714-637-0200
CA	San Diego, Western Micro	619-453-8430
CA	San Diego, Schweber Electrns	619-495-0015
CA	San Diego, Future	619-278-5020
CA	San Jose, Schweber Electrns	408-432-7171
CA	Saratoga, Western Micro	408-725-1660
CO	Englewood, Schweber Electrns	303-799-0258
CO	Westminster, Future Electrns	303-650-0123
CT	Oxford, Schweber Electrns	203-264-4700
FL	Altamonte Springs, Future Electrns	305-767-8414
FL	Altamonte Springs, Schweber Electrns	407-331-7555
FL	Clearwater, Future Electrns	813-578-2770
FL	Deerfield Beach, Vantage Comps	305-429-1001
FL	Pompano Beach, Schweber Electrns	305-997-7511
GA	Norcross, Schweber Electrns	404-449-9170
GA	Norcross, Future Electrns	404-441-7676
IL	Bensenville, GBL Goold	312-860-7171
IL	Schaumburg, Schweber Electrns	708-330-2888
IL	Schaumburg, Future Electrns	312-892-1255
IN	Indianapolis, Schweber Electrns	317-843-1050
IA	Cedar Rapids, Schweber Electrns	319-373-1417
KS	Overland Park, Schweber Electrns	913-492-2922
MD	Columbia, Schweber Electrns	301-596-7800
MD	Columbia, Future Electrns	301-955-1222
MD	Columbia, Vantage Comps	301-720-5100
MA	Andover, Vantage Comps	508-687-3900
MA	Burlington, Western Micro	617-273-2800
MA	Westborough, Future Electrns	617-366-2400
MA	Wilmington, Schweber Electrns	508-694-9100
MI	Livonia, Future Electrns	313-261-5270
MI	Livonia, Schweber Electrns	407-331-7555
MN	Eden Prairie, Schweber Electrns	612-941-5280
MN	Eden Prairie, Future Electrns	612-944-2200
MO	Earth City, Schweber Electrns	314-739-0526
MO	St. Louis, Future Electrns	314-537-0688
NJ	Cliifton, Vantage Comps	201-777-4100
NJ	Fairfield, Future Electrns	201-227-4346
NJ	Marlton, Western Micro	609-596-7775
NJ	Mt. Laurel, Schweber Electrns	609-273-7900
NJ	Mt. Laurel, Future Electrns	609-778-7600
NJ	Pinebrook, Schweber Electrns	201-227-7880
NY	Hauppage, Future Electrns	516-234-4000
NY	Hauppauge, Schweber Electrns	516-231-2500
NY	Liverpool, Future Electrns	315-451-2371
NY	Mt. Vernon, Janesway Electrns	914-699-6710
NY	Pittsford, Schweber Electrns	716-383-8020
NY	Rochester, CAM RPC Electrns	716-427-9999
NY	Rochester, Future Electrns	716-272-1120
NY	Smithtown, Vantage Comps	516-543-2000
NY	Westbury, Schweber Electrns Corp. Office	516-334-7474
NC	Charlotte, Future Electrns	704-529-5500
NC	Raleigh, Schweber Electrns	919-867-0000
OH	Beachwood, Schweber Electrns	216-464-2970
OH	Cleveland, CAM RPC Electrns	216-461-4700
OH	Dayton, Schweber Electrns	513-439-1800
OK	Tulsa, Schweber Electrns	918-622-8000
OR	Beaverton, Western Micro	503-629-2082
OR	Beaverton, Future Electrns	503-645-9454
PA	Pittsburgh, Schweber Electrns	412-963-6804
PA	Pittsburgh, CAM RPC Electrns	412-782-3770
TX	Austin, Omni Pro Electrns	512-794-9200
TX	Austin, Schweber Electrns	512-339-0088
TX	Dallas, Western Micro	214-248-3775
TX	Dallas, Omni Pro Electrns	214-233-0500
TX	Dallas, Schweber Electrns	214-247-6300
TX	Houston, Schweber Electrns	713-784-3600
TX	Richardson, Future Electrns	214-437-2437
UT	Salt Lake City, Future Electrns	801-972-8489
UT	Salt Lake City, Integrated Electrns	801-977-9750
WA	Bellevue, Future Electrns	206-881-8199
WA	Redmond, Western Micro	206-881-6737
WI	New Berlin, Schweber Electrns	414-784-9551
Can	Alberta, Calgary, Semad	403-252-5664
Can	British Columbia, Burnaby, Semad	604-420-9889
Can	British Columbia, Vancouver, Future Electrns	604-294-1166
Can	Ontario, Downsview, Future Electrns	416-638-4771
Can	Ontario, Markham, Semad	416-475-8500
Can	Ontario, Ottawa, Future Electrns	613-820-8313
Can	Quebec, Pointe Claire, Future Electrns	514-694-7710

SAMSUNG MICROWAVE SEMICONDUCTOR, INC., 1530 McCarthy Blvd.,
Milpitas, California 95035, Tel: 408-433-2222, FAX:
408-432-3268

Sales Office & Representatives

AZ	Phoenix, Compass Mktg & Sls	602-996-0635
CA	Signal Hill, The Thorson Co	310-595-0361
CA	Sunnyvale, C Stout Co	408-746-0470
KS	Olathe, Advanced Tech Sls	913-782-8702
MA	Woburn, Microwave Comps Mktg	617-273-3106
NY	Clark Mills, KLM Garner, Inc	315-853-6126
NY	Great Neck, Trionic Assocs	516-466-2300
OH	Cincinnati, Giesting & Assocs	513-385-1105
PA	Ivyland, Microwave Comps Mktg	215-953-1711
TX	Carrollton, Seaton Corp	214-980-9860
VA	Fairfax, Schibley Assocs., Inc	703-591-3008
WA	Bellevue, Northwest Mktg Assocs	206-455-5846
Can	Ont., Toronto, Norgay Enterprises, Ltd	416-234-8966

SAMSUNG SEMICONDUCTOR, INC., 3655
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408-954-7000, 1-800-446-2760, TELEX: 339544, FAX:
408-954-7883

Sales Office & Representatives

AL	Huntsville, Southern Comp Sales	205-533-6500
AZ	Phoenix, O,Donnell Assocs.	602-944-9542
CA	Calabasas, Westar Rep Co	818-880-0594
CA	Irvine, Westar Rep. Co.	714-453-7900

CA	Irvine, Samsung Semiconductor, Inc.	714-753-7530
CA	San Diego, Bestronics	619-693-1111
CA	San Jose, Samsung Semiconductors	408-954-7000
CA	Santa Clara, I-Squared	408-988-3400
CO	Boulder, Front Range Mktg	303-443-4780
FL	Ft. Lauderdale, Dyne-A-Mark Corp	305-771-6508
FL	Maitland, Dyne-A-Mark Corp	407-660-9407
FL	Miami, B & B Tech Sales	305-477-0341
FL	Palm Bay, Dyne-A-Mark Corp	407-724-7470
GA	Norcross, South Atlantic Comps Sls	404-447-6154
IL	Arlington Heights, Davix International Ltd.	708-259-5300
IL	Lisle, Samsung Semiconductors	708-775-1050
IN	Ft. Wayne, Gen II Mktg., Inc.	219-436-4485
IN	Indianapolis, GEN II Mktg., Inc.	317-848-3083
IA	Marion, Assoc. Elecronic Mrktrs., Inc.	319-377-1129
KS	Lenexa, Assoc. Electrn Mrktrs., Inc.	913-888-0022
KY	Louisville, Gen II Mktg., Inc.	502-894-9903
MA	Burlington, New Tech. Solutions, Inc.	617-229-8888
MA	Littleton, Samsung Semiconductor	617-486-0700
MI	Plymouth, Microtech Sls	313-459-0200
MN	Edina, GP Sales, Inc.	612-831-2362
MO	Bridgeton, Assoc. Electrn Mrktrs., Inc.	314-298-9900
NM	Albuquerque, O'Donnell Assocs.	505-889-4522
NY	Apalachin, T-Squared	617-625-3983
NY	Plainview, Neptune Elec.	516-349-1600
NY	Syracuse, T-Squared	315-699-1559
NY	Victor, T-Squared	716-924-9101
NC	Charlotte, South Atlantic Comp Sales	704-525-0510
NC	Greensboro, Samsung Semiconductors	919-370-1600
NC	Raleigh, South Atlantic Comp. Sales	919-859-9970
OH	Brunswick, J.N. Bailey & Assoc.	216-273-3798
OH	Columbus, J.N. Bailey & Assoc.	614-262-7274
OH	New Lebanon, J. N. Bailey & Assoc.	513-687-1325
OR	Beaverton, ATMI	503-643-8307
PA	Plymouth Meeting, CMS Mktg	215-834-6840
TX	Austin, Vielock Assoc.	512-345-8498
TX	Dallas, Samsung Semiconductors	214-770-7970
TX	El Paso, O'Donnell Assoc	915-778-2581
TX	Houston, Vielock Assocs.	713-974-3287
TX	Plano, Vielock Assoc.	214-881-1940
UT	Murray, Front Range Mktg	801-288-2500
WA	Redmond, ATMI	206-869-7636
WI	Menomonee, Davix Intl. Ltd.	414-255-1600
Can	Ontario, Kanata, Intelatech Inc.	613-253-1369
Can	Ontario, Mississauga, Intelatech, Inc.	416-629-0082
Can	Que., Kirkland, Intelatech,Inc.	514-630-6041
Intl	Austria, Wein, Satron Handelsgesellschaft mbH	0043-222-8123020
Intl	Belguim, Brussels, Samsung Semiconductors	0032-2-2456510
Intl	Belguim, Brussels, Inelco Elec. Comp. Div.	0032-2-2442911
Intl	Denmark, Kopenhagen, Exatec A/S	00453-1-191022
Intl	England, London, Samsung Semiconductors	0044-81-8629300
Intl	Finland, Espoo, Findip	00358-0-5284325
Intl	France, Cedex, Scaib	0033-1-46868170
Intl	France, Colombes, Asia MOS	0033-1-47601247
Intl	France, Paris, Samsung Semiconductor	0033-1-409407000
Intl	Germany, Samsung Semiconductor Europe GmbH	0049-6196-90090
Intl	Germany, Deisenhofen, Astronic GmbH	0049-89-6130303
Intl	Germany, Hanover, Canning Electrn Dist. GmbH	0049-511-865075
Intl	Germany, Moenchengladbach, Silcom Elec. Vertriebes GmbH	0049-2161-15074
Intl	Germany, Munchen, Samsung Semiconductors	0049-89-964838
Intl	Germany, Renningen, Micronetics GmbH	0049-7159-6019
Intl	Germany, Stutensee, MSC Vertriebs GmbH	0049-7249-7580
Intl	Hong Kong, Kowloon, Protech Comp. Ltd.	7930882
Intl	Hong Kong, Kowloon, Wiseworld Tech. Co.	7658923
Intl	Hong Kong, Kowloon, Right System Co., Ltd.	7566331
Intl	Hong Kong, Kowloon, Solari Computer Eng. Ltd.	72113318
Intl	Hong Kong, Kowloon, Central Sys Design Ltd.	5620248
Intl	Hong Kong, Kowloon, Dataworld Intl. Ltd.	7862611
Intl	Hong Kong,Kowloon, AV, Concept Ltd.	3629325
Intl	India,Bombay, Componemts and Sys Mktg. Assocs.	4114585
Intl	Ireland, Dublin, Neltronic Ltd.	00353-1-503560
Intl	Italy, Fanton Service S.R.L.	0039-51-735015
Intl	Italy, Balsamo, Moxel S.R.L.	0039-2-61290521
Intl	Italy, Milano, Samsung Semiconductors	0039-2-66400181
Intl	Italy, Torino, DIS. EL. SPA	0039-11-291930
Intl	Japan, Osaka, Rikei Corp.	06-201-2081
Intl	Japan, Tokyo, ADO Electrn Inds. Co., Ltd.	001-8133-257-1618
Intl	Japan, Tokyo, Intercompo Inc.	001-8133-406-5612
Intl	Japan, Tokyo, Chemi-Con Intl. Corp.	001-8133-508-2841
Intl	Japan, Tokyo, Tomen Electrns Corp.	0425-22-6145
Intl	Japan, Tokyo, DIA Semicon Sys Inc.	001-8133-487-0386
Intl	Korea, Seoul, Naewae Semiconductor Co., Ltd.	717-4065-7
Intl	Korea, Seoul, Samsung Light-Electrns Co., Ltd.	718-0045
Intl	Korea, Seoul, New Castle Semiconductor Co., Ltd.	718-8531-4
Intl	Korea, Seoul, Hankook Semiconductor & Telecomm. Co., Inc.	338-2015-8
Intl	Korea, Seoul, Seg Yung Interise Corp.	701-6811-6
Intl	Korea, Seoul, Segyung Electrns	273-6781-3
Intl	Korea, Seoul, Samtek	703-9656-8
Intl	Korea,Seoul, Sunin Inds. Co., Ltd.	718-7113-6
Intl	Netherlands, Malchus BV Handelmij	0031-10-4277777
Intl	Norway, Skarer, Exatecals	0047-2-972950
Intl	Singapore, Gemini Electrns PTE Ltd.	65-2263066
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SII

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OR	Tigard, Halbar-RTS, Inc	503-624-5741
TN	Jefferson City, Rep Inc	615-475-9012
TX	Austin, SGS-Thomson	512-502-3020
TX	Austin, Tech Reps Inc	512-452-2110
TX	Carrollton, SGS-Thomson	214-466-8844
TX	Dallas, Tech Reps Inc	214-713-9027
TX	Houston, SGS-Thomson	713-376-9939
UT	Salt Lake City, Luscombe Eng	801-268-3434
WA	Redmond, Halbar-RTS, Inc	206-882-0990
WA	Seattle, SGS-Thomson	206-527-0182
WA	Vashon, Halbar-RTS, Inc	206-285-1363
WI	Sheyboygan, Mid-Star Tech	414-457-0216
Can	B.C., Vancouver, Weiss Co Ltd	604-873-1112
Can	Manitoba, Winnipeg, Weiss Co Ltd	204-772-3665
Can	Ont., Mississauga, Weiss Co Ltd	416-673-0011
Can	Ont., Nepean, SGS-Thomson	613-829-9944
Can	Ont., Nepean, Weiss Co Ltd	613-225-1810
Can	Que., Dorval, Weiss Co Ltd	514-685-6644
Intl	Australia, NSW, Edgecliff, SGS-Thomson	61-2-327-39-22
Intl	Brazil, Sao Paulo, SGS-Thomson	55-11-883-5455
Intl	China, Beijing, SGS-Thomson	861-2024378
Intl	Denmark, Herlev, SGS-Thomson	45-42-94-85-33
Intl	Finland, Lohja, SGS-Thomson	12-155-11
Intl	France, Gentilly, Cedex, SGS-Thomson	33-1-47-40-75-75
Intl	France, Strasbourg, SGS-Thomson	33-88-75-50-66
Intl	Hong Kong, Wanchai, SGS-Thomson	852-2-8615788
Intl	India, New Delhi, SGS-Thomson	3715191
Intl	Italy, Assago, SGS-Thomson	39-2-89213-1
Intl	Italy, Casalecchio Di Reno, SGS-Thomson	39-51-591914
Intl	Italy, Roma, SGS-Thomson	39-6-8443341
Intl	Japan, Tokyo, SGS-Thomson	81-3-280-4121
Intl	Korea, Seoul, SGS-Thomson	82-2-553-0399
Intl	Netherlands, SGS-Thomson	31-40-550015
Intl	Singapore, SGS-Thomson	65-4821411
Intl	Spain, Barcelona, SGS-Thomson	34-3-4143300-4143361
Intl	Spain, Madrid, SGS-Thomson	34-1-4051615
Intl	Sweden, Kista, SGS-Thomson	46-8-7939220
Intl	Switzerland, Geneva, SGS-Thomson	41-22-7986462
Intl	Taiwan, Taipei, SGS-Thomson	886-2-755-4111
Intl	United Kingdom, Bucks,Marlow, SGS-Thomson	44-628-890800
Intl	West Germany, Frankfurt, SGS-Thomson	49-69-237492
Intl	West Germany, Grasbrunn, SGS-Thomson	49-89-460060
Intl	West Germany, Hannover, SGS-Thomson	49-511-634191
Intl	West Germany, Nurnberg, SGS-Thomson	49-911-597032
Intl	West Germany, Siegburg, SGS-Thomson	49-2241-660-84-86
Intl	West Germany, Stuttgart, SGS-Thomson	49-711-692041
PR	Rio Piedras, SGS-Thomson	809-754-7730

SHARP ELECTRONICS CORPORATION,
5700 N.W. Pacific Rim Blvd., Camas, Washington 98607,
Tel: 206-834-2500, FAX: 206-834-8903

Sales Office & Representatives

AL	Daphne, Interep Assoc	205-621-1036
AL	Huntsville, Interep Assoc	205-881-1096
AZ	Tempe, Elctrn Tech Sls	602-921-7122
CA	Granada Hills, Plustronics	818-830-3304
CA	Irvine, Sharp Elctrns Corp	714-250-0225
CA	Newport Beach, Plustronics	714-476-8009
CA	San Diego, Mesa Comps	619-278-8021
CA	San Jose, Sharp Elctrns Corp	408-436-4900
CA	Santa Clara, Criterion Sls	408-988-6300
CO	Denver, Seale & Assocs	303-695-1980
CT	Meriden, Delta-Conn Tech Sls	203-634-8558
FL	N. Lauderdale, Comp Design Mktg	305-726-5444
FL	Orlando, Comp Design Mktg	407-240-3903
FL	Tampa, Comp Design Mktg	813-886-9721
GA	Norcross, Interep Assoc	404-449-8680
IL	Glendale Heights, Synergistic Sls	708-858-8686
IL	Romeoville, Sharp Elctrns Corp	708-759-6318
IN	Indianapolis, Mohrfield Mktg	317-546-6969
IN	Kokomo, Micro-Comps	317-454-6988
IN	Leo, Mohrfield Mktg	219-627-5355
IA	Cedar Rapids, Spectrum Sls	319-366-0576
KS	Overland Park, Spectrum Sls	913-648-6811
KY	Lexington, Mohrfield Mktg	606-276-0478
MD	Towson, Advanced Technlg Sls	410-296-9360
MA	Burlington, Sharp Elctrns Corp	617-270-7979
MA	Burlington, Genesis Assocs	617-270-9540
MI	Bloomfield Hills, Trilogy Mktg., Inc	313-338-2470
MI	Bloomfield Hills, Sharp Electrns Corp	313-338-9944
MN	Minneapolis, Reptek	612-331-1212
MO	Florissant, Spectrum Sls	314-921-1313
NJ	W. Caldwell, Tech Mktg Grp	201-226-3300
NY	Binghamton, Micro-Tech Mktg	607-771-8867
NY	Melville, Tech Mktg Grp	516-351-8833
NY	New Paltz, Micro-Tech Mktg	914-255-7019
NY	Rochester, Micro-Tech Mktg	716-426-0806
NC	Raleigh, Sharp Elctrns Corp	919-941-0065
NC	Raleigh, EnVision	919-231-9939
OH	Dayton, Five Star Elctrns	513-299-1718
OH	Solon, Five Star Elctrns	216-349-1611

OR	Beaverton, Blair Hirsh Co	503-641-1875
PA	Hatboro, Delta Tech Sls	215-957-0600
SC	Columbia, EnVision	803-699-3360
TN	Greenville, Interep Assoc	615-639-3491
TX	Austin, RAM Electrns	512-250-5082
TX	DFW Airport, Sharp Elctrns Corp	214-574-5205
TX	El Paso, RAM Electrns	915-533-9707
TX	Houston, Sharp Elctrns Corp	713-955-9909
TX	Houston, RAM Electrns	713-580-7394
TX	Plano, RAM Electrns	214-578-5400
VA	Richmond, Advanced Technlgy Sls	804-320-8756
WA	Lynnwood, Blair Hirsh Co	206-774-8151
WI	Brookfield, Synergistic Sls	414-821-1516
Can	Alb., Calgary, Enerlec Sls Ltd	403-256-3627
Can	B.C., Richmond, Enerlec Sls Ltd	604-273-0882
Can	Ont., Kanata, Indigo Elctrns Ltd.	613-591-1053
Can	Ont., Mississauga, Indigo Elctns Ltd	416-670-0284
Can	Que., Dollard desOrmeaux, PQ, Indigo Elctrns Ltd	514-696-6104
Intl	Germany, Hamburg, Sharp Electrns GmbH	040-23775-0
Intl	Hong Kong, Sharp-Roxy (Hong Kong) Ltd	8229311/8229348
Intl	Japan, Tenri-City Nara, Sharp Corp.	07436-5-1321
Intl	Korea, Seoul, Sharp Electrns Industrial Corp.	782-8637-40
Intl	Mexico, (Arlington,TX), Ion & Assocs	817-695-8000
Intl	Singapore, Sharp-Roxy Sals (Singapore)Pte. Ltd.	4731911

Distributors

AL	Huntsville, Marshall Inds	205-881-9235
AL	Huntsville, Reptron Elctrns	205-722-9500
AZ	Phoenix, Marshall Inds	602-496-0290
AZ	Phoenix, Sterling Elctrns	602-437-5565
AZ	Scottsdale, Added Value Elctrns	602-951-9788
CA	Agoura Hills, Western Microtechnology	818-707-0377
CA	Azusa, Sterling Elctrns	818-969-6801
CA	Calabasas, Marshall Inds	818-878-7000
CA	Camarillo, Milgray Elctrns	805-484-4055
CA	Chatsworth, Sterling Elctrns	818-407-8850
CA	El Monte, Marshall Inds	818-307-6000
CA	Irvine, Marshall Inds	714-458-5301
CA	Irvine, Milgray Elctrns	714-753-1282
CA	Milpitas, Marshall Inds	408-942-4600
CA	Orange, Western Microtechnology	714-637-0200
CA	Ranch Cordova, Marshall Inds	916-635-9700
CA	San Diego, Added Value Elctrns	619-558-8890
CA	San Diego, Marshall Inds	619-627-4040
CA	San Diego, Sterling Elctrns	619-560-8097
CA	San Diego, Western Microtechnology	619-453-8430
CA	San Jose, Milgray Elctrns	408-456-0900
CA	San Jose, Sterling Elctrns	408-435-5566
CA	Saratoga, Western Microtechnology	408-725-1660
CA	Tustin, Added Value Elctrns	714-259-8258
CA	Tustin, Sterling Elctrns	714-259-0900
CA	Visalia, Added Value Elctrns	209-734-8861
CO	Englewood, Sterling Elctrns	303-792-3939
CO	Thornton, Marshall Inds	303-451-8383
CO	Wheat Ridge, Added Value Elctrns	303-422-1701
CT	Milford, Milgray Elctrns	203-878-5538
CT	Wallingford, Marshall Inds	203-265-3822
CT	Wallingford, Sterling Elctrns	203-265-9535
FL	Altamonte Springs, Marshall Inds	407-767-8585
FL	Ft. Lauderdale, Marshall Inds	305-977-4880
FL	Ft. Lauderdale, Reptron Elctrns	305-735-1112
FL	Lake Mary, Milgray Elctrns	407-321-2555
FL	St. Petersburg, Marshall Inds	813-573-1399
FL	Tampa, Reptron Elctrns	813-854-2351
GA	Norcross, Marshall Inds	404-923-5750
GA	Norcross, Milgray Elctrns	404-446-9777
GA	Norcross, Reptron Elctrns	404-446-1300
IL	Palatine, Milgray Elctrns	708-202-1900
IL	Schaumburg, Marshall Inds	708-490-0155
IL	Schaumburg, Reptron Elctrns	708-882-1700
IL	Schaumburg, Sterling Elctrns	708-303-9900
IN	Indianapolis, Marshall Inds	317-297-0483
KS	Lenexa, Marshall Inds	913-492-3121
KS	Lenexa, Sterling Elctrns	913-492-5406
KS	Overland Park, Milgray Elctrns	913-236-8800
LA	Westwego, Sterling Elctrns	504-436-1418
MD	Columbia, Milgray Elctrns	301-995-6169
MD	Columbia, Sterling Elctrns	410-290-3800
MD	Silver Spring, Marshall Inds	301-622-1118
MA	Burlington, Western Microtechnolgoy	617-273-2800
MA	Wilmington, Marshall Inds	508-658-0810
MA	Wilmington, Milgray Elctrns	508-657-5900
MA	Woburn, Sterling Elctrns	617-938-6200
MI	Livonia, Marshall Inds	313-525-5850
MI	Livonia, Reptron Elctrns	313-525-2700
MN	Minneapolis, Sterling Elctrns	612-831-2666
MN	Minnetonka, Repton Elctrns	612-938-0000
MN	Plymouth, Marshall Inds	612-559-2211
MO	Bridgeton, Marshall Inds	314-291-4650
NJ	Edison, Sterling Elctrns	908-417-1000
NJ	Fairfield, Marshall Inds	201-882-0320
NJ	Marlton, Milgray Elctrns	609-983-5010
NJ	Marlton, Western Microtechnology	609-594-7775
NJ	Mt. Laurel, Marshall Inds	609-234-9100
NJ	Parsippany, Milgray Elctrns	201-335-1766
NM	Albuquerque, Sterling Elctrns	505-884-1900
NY	Endicott, Marshall Inds	607-798-1611
NY	Farmingdale, Milgray Elctrns	516-420-9800
NY	Hauppauge, Marshall Inds	516-273-1515
NY	Pittsford, Milgray Elctrns	716-381-9700
NY	Rochester, Marshall Inds	716-235-7620
NY	West Babylon, Sterling Elctrns	516-293-6622
NC	Raleigh, Marshall Inds	919-878-9882
NC	Raleigh, Milgray Elctrns	919-790-8094
NC	Raleigh, Reptron Elctrns	919-870-5189
NC	Raleigh, Sterling Elctrns	919-790-8634
OH	Cleveland, Milgray Elctrns	216-447-1520
OH	Dayton, Marshall Inds	513-898-4480
OH	Solon, Marshall Inds	216-248-1788
OH	Solon, Reptron Elctrns	216-349-1415
OH	Solon, Sterling Elctns	216-248-1122
OK	Tulsa, Sterling Elctrns	918-663-2410
OR	Beaverton, Marshall Inds	503-644-5050
OR	Beaverton, Western Microtechnology	503-629-2082
PA	Pittsburgh, Marshall Inds	412-788-0441
TX	Austin, Marshall Inds	512-837-1991
TX	Austin, Sterling Elctrns	512-836-1341
TX	Carrollton, Marshall Inds	214-233-5200
TX	Carrollton, Sterling Elctrns	214-243-1600
TX	Dallas, Milgray Elctrns	214-248-1603
TX	Houston, Marshall Inds	713-467-1666
TX	Houston, Sterling Elctrns	713-627-9800
TX	Stafford, Milgray Elctrns	713-240-5360
UT	Murray, Milgray Elctrns	801-261-2999
UT	Salt Lake City, Marshall Inds	801-973-2888
UT	Salt Lake City, Sterling Elctrns	801-972-5444
UT	West Valley City, Added Value Elctrns	801-975-9500
VA	Richmond, Sterling Elctrns	804-226-2190
WA	Bothell, Marshall Inds	206-486-5747
WA	Kirkland, Western Microtechnology	206-828-2741
WI	Waukesha, Marshall Inds	414-767-8400
Can	Alb., Calgary, Future Elctrns	403-250-5550
Can	Alb., Edmonton, Future Elctrns	403-438-2858
Can	B.C., Vancouver, Future Elctrns	604-294-1166
Can	Manitoba, Winnipeg, Future Elctrns	204-786-7711
Can	Ont., Brampton, Marshall Inds	416-458-8046
Can	Ont., Mississauga, Future Elctrns	416-612-9200
Can	Ont., Mississauga, Milgray Elctrns	416-678-0958
Can	Ont., Ottawa, Future Elctrns	613-820-8313
Can	Que., Pointe Claire, Future Elctrns	514-694-7710
Can	Que., Pointe Claire, Marshall Inds	514-694-8142
Can	Que., Pointe Claire, Milgray Elctrns	514-426-5900
Can	Que., Quebec City, Future Elctrns	418-877-6666
PR	Canovanas, Milgray Elctrns	809-876-8200

SIEMENS COMPONENTS, INC., 10950 N. Tantau Ave., Cupertino, California 95014-0716, Tel: 408-777-4500, TELEX: 84-4491

Sales Office & Representatives

AL	Daphne, Interep Assocs., Inc.	205-621-1036
AL	Huntsville, Interep Assocs., Inc.	205-881-1096
AZ	Phoenix, Reptronix, Ltd.	602-230-2630
CA	Cupertino, Seimens Comps, Inc.	408-777-4500
CA	Orange, Siemens Comps., Inc.	714-971-1274
CA	San Diego, Varigon, Inc.	619-576-0100
CA	Simi Valley, DynaRep, Inc.	818-591-7366
CA	Tustin, DynaRep, Inc.	714-258-8022
CO	Littleton, Lange Sales, Inc.	303-795-3600
GA	Norcross, Siemens Comps., Inc.	404-449-3981
GA	Norcross, Interep Assocs., Inc.	404-449-8680
ID	Boise, Lange Sls., Inc.	208-323-0713
IL	Arlington Heights, KMA Sls. Co.	708-398-5300
IL	Schaumburg, Siemens Comps., Inc.	708-884-7009
IN	Indianapolis, Leslie M. DeVoe Co.	317-842-3245
KS	Olathe, GM Brown & Assocs	913-829-3086
MD	Baltimore, Micro-Comp, Inc.	301-644-5700
MD	Gaithersburgh, Pioneer-Standard/Pioneer Tech	301-921-3822
MA	Waltham, Paramount Tech, Inc	617-890-8505
MA	Westford, Siemens Comps., Inc.	508-692-0550
MI	Bloomfield Hills, Enco Mktg., Inc.	313-338-8600
MI	Grand Rapids, Pioneer-Standard/Pioneer Tech	616-698-9600
MI	Livonia, Siemens Comps., Inc.	313-462-1195
MI	Troy, Pioneer-Standard/Pioneer Tech	313-641-0555
MN	St.Paul, Cahill-Schmitz & Cahill Inc.	612-646-7217
MO	Florissant, GM Brown & Assocs	314-839-3600
NJ	Iselin, Siemens Comps., Inc.	908-603-0600
NJ	Mt. Laurel, Siemens Comps., Inc.	609-273-6677
NM	Albuquerque, Reptronix, Ltd.	505-292-1718
NY	Fairport, L-Mar Assocs., Inc.	716-425-9100
NY	Fairport, Pioneer-Standard/Pioneer Tech	716-381-7070
NY	Franklin Sq., Cooper-Simon Emtec, Inc.	516-489-0404
NY	Woodbury, Pioneer-Standard/Pioneer Tech	516-921-8700
NC	Matthews, ADI	704-847-4323
NC	Smithfield, ADI	919-934-8136
OH	Cincinnati, Frank J Campisano Co	513-574-7111
OH	Cleveland, Pioneer-Standard/Pioneer Tech	216-581-0080
OH	Columbus, Frank J Campisano Co	614-538-1176
OH	Dayton, Pioneer-Standard/Pioneer Tech	513-236-9900
OH	Mentor, Frank J Campisano Co	216-975-9300
OH	Solon, Pioneer-Standard/Pioneer Tech Sys/Svc Div	216-248-8710
OH	Solon, Pioneer-Standard/Pioneer Tech	216-349-1300
OH	Twinsburg, Pioneer-Standard/Pioneer Tech (Corp. Distrib)	216-487-5500
OR	Tigard, Earl & Brown	503-639-2100
PA	Hatboro, Delta Tech. Sls.	215-957-0600
PA	Horsham, Pioneer-Standard/Pioneer Tech	215-674-4000
PA	Pittsburgh, Pioneer-Standard/Pioneer Tech	412-782-2300
TN	Greeneville, Interep Assocs., Inc.	615-639-3491
TX	Austin, Quad Sts. Sls. & Mktg.	512-346-7002
TX	Dallas, Siemens Comps., Inc.	214-733-4511
TX	Dallas, Quad Sts. Sls. & Mktg.	214-669-8709
TX	Houston, Quad Sts. Sls. & Mktg.	713-893-8585
TX	San Antonio, Pioneer-Standard/Pioneer Tech	512-377-3440
UT	Salt Lake City, Lange Sales Inc.	801-487-0843
WA	Redmond, Earl & Brown	206-885-5064
WI	Milwaukee, KMA Sls. Co.	414-259-1771
Can	Alberta, Calgary, Siemens Elec Ltd.	403-252-2278
Can	Alberta, Calgary, Siemens Elec Ltd.	403-252-2278
Can	Alberta, Edmonton, Siemens Elec Ltd.	403-450-6762
Can	Alberta, Edmonton, Siemens Elec Ltd.	403-436-6640
Can	British Columbia, Vancouver, Siemens Elec Ltd.	604-321-8687
Can	British Columbia, Victoria, Siemens Elec Ltd.	604-727-6465
Can	Manitoba, Winnipeg, Siemens Elec Ltd.	204-633-8655
Can	New Brunswick,Fredericton, Siemens Elec Ltd.	506-458-9788
Can	Nfld., Mt. Pearl, Siemens Elec Ltd.	709-364-5131
Can	Nova Scotia, Dartmouth, Siemens Comps., Inc.	902-469-9791
Can	Ontario, Burlington, Siemens Elec Ltd.	416-333-3773
Can	Ontario, Kanata, Siemens Elec Ltd.	613-592-2477
Can	Ontario, London, Siemens Elec Ltd.	519-685-7282
Can	Ontario, Mississauga, Siemens Comps., Inc.	416-564-1995
Can	Ontario, Nepean, Siemens Elec Ltd.	613-721-8180
Can	Ontario, Timmins, Siemens Elec Ltd.	705-267-7755
Can	Quebec, Drummondville, Siemens Elec Ltee.	819-472-1155

Can	Quebec, Lasalle, Siemens Elec Ltee.	514-365-3315
Can	Quebec, Pt. Claire, Siemens Elec Ltee.	514-695-7300
Can	Quebec, Sherbrooke, Siemens Elec Ltd.	819-563-9656
Can	Quebec, Ste-Foy, Siemens Elec Ltee.	418-687-4524
Can	Saskatchewan, Regina, Siemens Comps., Inc.	306-352-9910
Can	Saskatchewan, Saskatoon, Siemens Elec Ltd.	306-652-3101
PR	San Juan, Klamco Elec.	809-755-2625

Distributors

AL	Huntsville, Pioneer-Standard/Pioneer Tech	205-837-9300
AL	Huntsville, Marshall	205-881-9235
AZ	Pheonix, Marshall	602-496-0290
AZ	Tempe, Insight Electrns	602-829-1800
CA	Agoura Hills, Pioneer-Standard/Pioneer Tech	818-865-5800
CA	Calabasas, Marshall	818-878-7000
CA	Chatsworth, Marshall	818-407-4100
CA	Concord, Pioneer-Standard/Pioneer Tech	415-676-1355
CA	Irvine, Pioneer-Standard/Pioneer Tech	714-753-5650
CA	Irvine, Insight Elctrns	714-727-3291
CA	Irvine, Marshall	714-458-5301
CA	Milpitas, Marshall	408-942-4600
CA	Milpitas, Pioneer-Standard/Pioneer Tech	408-945-9100
CA	Rancho Cordova, Marshall	916-635-9700
CA	San Diego, Insight Elctrns	619-587-1100
CA	San Diego, Marshall	619-578-9600
CA	San Jose, Hall-Mark	408-432-4000
CA	San Jose, Pioneer-Standard/Pioneer Tech	408-954-9100
CA	Sunnyvale, Insight Elctrns	408-720-9222
CA	Westlake Village, Insight Elctrns	818-707-2101
CO	Aurora, Insight Elctrns	303-693-4256
CO	Thornton, Marshall	303-451-8383
CT	Shelton, Pioneer-Standard/Pioneer Tech	203-929-5600
CT	Wallingford, Marshall	203-265-3822
FL	Altamonte Springs, Pioneer-Standard/Pioneer Tech	407-834-9090
FL	Altamonte Springs, Marshall	407-767-8585
FL	Deerfield Bch, Pioneer-Standard/Pioneer Tech	305-428-8877
FL	Ft. Lauderdale, Marshall	305-977-4880
FL	St. Petersburg, Marshall	813-573-1399
GA	Duluth, Pioneer-Standard/Pioneer Tech	404-623-1003
GA	Norcross, Marshall	404-923-5750
IL	Addison, Pioneer-Standard/Pioneer Tech	708-495-9680
IL	Rosemont, Advent Electrns	312-297-6200
IL	Schaumburg, Marshall	708-490-0155
IN	Indianapolis, Advent Electrns	317-872-4910
IN	Indianapolis, Pioneer-Standard/Pioneer Tech	317-573-0880
IN	Indianapolis, Marshall	317-297-0483
IA	Cedar Rapids, Advent Electrns	319-363-0221
KS	Lenexa, Marshall	913-492-3121
MD	Gaithersburgh, Pioneer-Standard/Pioneer Tech	301-921-0660
MD	Silver Springs, Marshall	301-622-1118
MA	Lexington, Pioneer-Standard/Pioneer Tech	617-861-9200
MA	Wilmington, Marshall	508-658-0810
MI	Farmington Hills, Advent	313-477-1650
MI	Livonia, Pioneer-Standard/Pioneer Tech	313-525-1800
MI	Livonia, Marshall	313-525-5850
MN	Eden Prairie, Pioneer-Standard/Pioneer Tech	612-944-3355
MN	Plymouth, Marshall	612-559-2211
MO	Bridgeton, Marshall	314-291-4650
MO	St. Louis, Pioneer-Standard/Pioneer Tech	314-542-3077
NJ	Fairfield, Marshall	201-882-0320
NJ	Fairfield, Pioneer-Standard/Pioneer Tech	201-575-3510
NJ	Mt. Laurel, Marshall	609-234-9100
NY	Binghamton, Pioneer-Standard/Pioneer Tech	607-722-9300
NY	Endicott, Marshall	607-785-2345
NY	Hauppauge, Marshall	516-273-2424
NY	Johnson City, Marshall	607-798-1611
NY	New York, Pioneer-Standard/Pioneer Tech	212-971-9560
NY	Rochester, Marshall	716-235-7620
NC	Morrisville, Pioneer-Standard/Pioneer Tech	919-460-1530
NC	Raleigh, Marshall	919-878-9882
OH	Cleveland, Pioneer-Standard/Pioneer Tech	216-587-3600
OH	Dayton, Marshall	513-898-4480
OH	Reynoldsburg, Pioneer-Standard/Pioneer Tech	614-236-1000
OH	Solon, Marshall	216-248-1788
OK	Tulsa, Pioneer-Standard/Pioneer Tech	918-665-7840
OR	Beaverton, Marshall	503-644-5050
OR	Beaverton, Insight Elctrns	503-644-3300
PA	Pittsburgh, Marshall	412-788-0441
TX	Austin, Pioneer-Standard/Pioneer Tech	512-835-4000
TX	Austin, Marshall	512-837-1991
TX	Austin, Insight Elctrns	512-467-0800
TX	Carrollton, Marshall	214-233-5200
TX	Dallas, Pioneer-Standard/Pioneer Tech	214-386-7300
TX	Houston, Pioneer-Standard/Pioneer Tech	713-879-3326
TX	Houston, Marshall	713-895-9200
TX	Richardson, Insight Elctrns	214-783-0800
TX	Sugarland, Insight Elctrns	713-448-0800
UT	Salt Lake City, Marshall	801-973-2288
WA	Bothel, Marshall	206-486-5747
WA	Kirkland, Insight Elctrns	206-820-8100
WI	Brookfield, Pioneer-Standard/Pioneer Tech	414-784-3480
WI	Waukesha, Marshall	414-797-8400

SIERRA SEMICONDUCTOR

CORPORATION, 2075 N. Capitol Ave., San Jose, California 95132, Tel: 408-263-9300, 408-263-9399, TELEX: 384467, FAX: 408-263-3337

Sales Office & Representatives

AL	Huntsville, Montgomery Mktg, Inc	205-830-0498
AZ	Scottsdale, Summit Sls	602-998-4850
CA	Cameron Park, Brooks Tech Grp	916-676-2025
CA	Irvine, Harper & Strong	714-261-7233
CA	Irvine, Sierra Semiconductor	714-261-5707
CA	Mountain View, Brooks Tech Grp	415-960-3880
CA	San Diego, Pathfinder Elctrns	619-578-2555
CO	Wheat Ridge, Wescom Mktg	303-422-8957
CT	Woodbury, Lindco Assocs, Inc	203-266-0728
FL	Casselberry, Dyne-A-Mark Corp	407-831-2822
FL	Ft. Lauderdale, Dyne-A-Mark Corp	305-771-6508
FL	Palm Bay, Dyne-A-Mark Corp	407-725-7470
FL	St. Petersburg, Dyne-Mark Corp	813-345-9411
GA	Norcross, Montgomery Mktg, Inc	404-447-6124
IL	Rolling Meadows, Eagle Tech Sls	708-991-0700
IN	Indianapolis, Electrn Sls & Eng	317-849-4260
MD	Burtonsville, Chesapeake Tech	301-236-0530
MA	Burlington, New Tech Solutions	617-229-8888
MA	Burlington, Sierra Semiconductor	617-229-6868
MI	Farmington Hills, Tritech Sls, Inc	313-442-1200
MN	Minneapolis, P.S.I. Co	612-944-8545
NJ	Medford, The McCoy Grp, Inc	609-953-0770
NY	Melville, Parallax Sls	516-351-1000
NY	Syracuse, Pitronics, Inc	315-455-7346
NC	Raleigh, Montgomery Mktg, Inc	919-851-0010
OH	Cleveland, Arthur Baier Co	216-292-7500
OH	Dayton, Arthur Baier Co	513-276-4128
OH	West Chester, Arthur Baier Co	513-779-2395
OH	Worthington, Arthur Baier Co	614-764-1144
OR	Beaverton, L-Squared Ltd	503-629-8555
PA	Pittsburgh, Arthur Baier Co	412-367-7799
PA	Valley Forge, The McCoy Grp, Inc	215-783-1919
TX	Austin, Logic 1 Sls	512-345-2952
TX	Houston, Logic 1 Sls	713-444-7594
TX	Richardson, Logic 1 Sls	214-234-0765
TX	Richardson, Sierra Semiconductor	214-783-8284
UT	Salt Lake City, Wescom Mktg, Inc	801-269-0419
WA	Kirkland, L-Squared, Ltd	206-827-8555
WI	Waukesha, Eagle Tech Sls	414-896-0633
Can	Ont., Brampton, Cantec Reps Inc (Toronto)	416-791-5922
Can	Ont., Ottawa, Cantec Reps Inc (Ottawa)	613-725-3704
Can	Que., Montreal, Cantec Reps Inc	514-623-5496
Intl	Australia, Neutral Bay, NSW, Reptechnic	011-61-2-953-9844
Intl	Australia, Riverwood, Advanced Comp Dist	011-61-2-534-6200
Intl	Austria, Wien, Thomas Neuroth GmbH	011-43-1-825645
Intl	Belguim, Bruxelles, Inelco Comps & Network	011-32-2-2442811
Intl	Denmark, Copenhagen, Exatec A/S	011-45-31-191022
Intl	England, Swindon, Sierra Semiconductor Ltd	011-44-793-618492
Intl	Finland, Helsinki, Comodo OY	011-358-0-757-2266
Intl	France, Trappes, ASAP Comps	011-09-33-1-30122020
Intl	Germany, Muenchen, Sierra Semiconductor GmbH	011-49-89-9101088
Intl	Germany, Muenchen, Neumueller, GmbH	011-49-89-612080
Intl	Germany, Schenefeld, Beka Electrn GmbH	011-49-40-8300031
Intl	Germany, Ueberlingen, Eltronix GmbH	011-49-7551-80080
Intl	Hong Kong, Kowloon, Karven Elctrns Ltd	011-852-385-7883
Intl	India, Bombay, Gaekwar Enterprise	011-91-22-4943459
Intl	Israel, Tel Aviv, Advanced Semi Tech Ltd	011-972-52-583355
Intl	Italy, Arona, Sierra Semiconductor Srl	011-39-322-45744
Intl	Italy, Cassinade Pecchi, De Mico S.p.A	011-39-2-95343600
Intl	Japan, Tokyo, H.Y. Assocs Co, Ltd	011-81-3-3929-7111
Intl	Korea, Seoul, Excel-Tech	011-82-2-335-7823/4
Intl	Korea, Seoul, Tritech Microelec Intl Pte Ltd	011-82-2-571-5781
Intl	Netherlands, Sierra Semiconductor B.V. (European H.Q.)	011-31-73-408888
Intl	Netherlands, Semicon B.V.	011-31-40-83-7075
Intl	Portugal, Lisbon, Digicontrole	011-351-1-805730
Intl	Russia, Moscow, CMS-NY	011-7-95-1683538
Intl	Singapore, Tritech Microelec Inter Pte Ltd	011-65-778-8211
Intl	Singapore, Chartered Telmos Design Pte Ltd	011-65-778-9331
Intl	Spain, Madrid, Sagitron, S.A.	011-34-1-4169261
Intl	Sweden, Solna, Nortec Elctrns AB	011-46-8-705-1800
Intl	Switzerland, Baden-Daettwil, Ascom Primotec AG	011-41-56-84-0171
Intl	Taiwan, Taipei, ROC, Acer Sertek Inc	011-886-2-501-0055
Intl	Taiwan, Taipei, ROC, Tritech Microelec Intl Pte Ltd	011-886-2-761-8555
Intl	U. K., Amega Electrns Ltd	011-44-256-843166

Distributors

CA	Camarillo, Milgray, Elctrns	800-635-7812, 805-484-4055
CA	Fountain Valley, Bell Microproducts	714-963-0667
CA	Irvine, ITT Multicomponents	714-727-4001
CA	Irvine, Milgray Elctrns	800-468-9277, 714-753-1282
CA	San Jose, ITT Muticomponents	408-453-1404
CA	San Jose, Bell Microproducts	408-451-9400
CA	San Jose, Milgray Elctrns	408-456-0600
CT	Danbury, Phase One Technlg	203-791-9042
CT	Milford, Milgray Elctrns	800-922-6911, 203-878-5538
FL	Lake Mary, Milgray Elctrns	800-367-0780, 407-321-2555
GA	Norcross, Milgray Elctrns	800-241-5523, 404-446-9777
IL	Palatine, Milgray Elctrns	800-322-6271, 708-202-7300
KS	Overland Park, Milgray Elctrns	913-236-8800
MD	Columbia, Milgray Elctrns	800-638-6656, 301-621-8169
MA	Wilmington, Milgray Elctrns	508-657-5900
MA	Wilmington, Bell Microproducts	508-658-0222
NJ	Elmwood Park, Phase One Technlg	201-791-2990
NJ	Marlton, Milgray Elctrns	800-257-7111, 609-983-5010
NJ	Parsippany, Milgray Elctrns	800-622-0291, 201-335-1766

NY	Deer Park, Phase One Technlg	516-254-2600
NY	Farmingdale, Milgray Elctrns	800-MIL-GRAY, 516-391-3000
NY	Pittsford, Milgray Elctrns	716-381-9700
NC	Raleigh, Milgray Elctrns	800-562-3118, 919-790-8094
OH	Cleveland, Milgray Elctrns	800-321-0006, 216-447-1520
TX	Dallas, Milgray Elctrns	214-248-1603
TX	Stafford, Milgray Elctrns	800-962-1849, 713-240-5360
UT	Salt Lake City, Milgray Elctrns	801-261-2999
Can	Alb., Calgary, ITT Multicomponents-Calgary	403-273-2780
Can	B.C., Burnaby, ITT Multicomponents-Vancouver	604-421-6222
Can	Ont., Concord, ITT Multicomponents-Toronto	416-798-4884
Can	Ont., Mississauga, Milgray Elctrns	416-736-1144
Can	Ont., Nepean, ITT Multicomponents-Ottawa	613-596-6980
Can	Que., Pointe Claire, Milgray Elctrns	514-426-5900
Can	Que., Pointe Claire, ITT Multicomponents-Montreal	514-426-5900
Can	Que., Ville St. Laurent, ITT Multicomponents-Montreal	514-335-7697

SIGNAL PROCESSING TECHNOLOGIES,

4755 Forge Road, Colorado Springs, Colorado 80907,
Tel: 719-528-2300, FAX: 719-528-2370

Sales Office & Representatives

AL	Huntsville, ELCOM	205-830-4001
AZ	Scottsdale, B.S.E. Inc	602-483-0373
CA	Aliso Viejo, Pro Assocs Inc So	714-588-2700
CA	Gardena, Ellen & Co Inc	310-366-1314
CA	Reseda, Jan Devices, Inc	818-708-1100
CA	San Jose, Tri-Par Assocs., Inc.	408-262-3190
CA	Solana Beach, CERCO	619-792-5555
CO	Parker, W. Howard Assocs.	303-841-5755
CT	North Haven, Kitchen & Kutchin	203-239-0212
FL	Boca Raton, Perrott Assocs., Inc.	407-362-0191
FL	Casselberry, Perrott Assocs., Inc.	407-830-0094
FL	Melbourne, Perrott Assocs., Inc.	407-676-0305
FL	Palm Harbor, Perrott Assocs., Inc.	813-789-9393
GA	Norcross, ELCOM	404-447-8200
IL	Chicago, Leeds Elctrns	312-625-3800
IL	Iverness, Heartland Tech. Mktg., Inc.	708-358-6622
IN	Ft. Wayne, TX Sales, Inc.	219-489-4447
IN	Ft. Wayne, Meunier Elec Supply	219-493-7029
IA	Cedar Rapids, Midwest Tech. Sls.,Inc.	319-377-1688
KS	Goddard, Midwest Tech. Sls., Inc.	316-794-8565
KS	Lenexa, Midwest Tech. Sls., Inc.	913-888-5100
KY	Louisville, Meunier Elec Supply	502-895-5060
MD	Baltimore, Rep-tron, Inc.	301-995-6322
MA	Burlington, Kitchen & Kutchin, Inc.	617-229-2660
MN	Minneapolis, D.A.Case Assocs., Inc.	612-831-6777
MN	Roseville, Parts One	612-633-8079
MO	Earth City, Midwest Tech. Sls., Inc.	314-298-8787
NM	Albuquerque, Nelco Electronix	505-293-1399
NY	Jericho, J-Square Mktg., Inc.	516-935-3200
NY	N.Syracuse, Entec Grp Inc	315-458-7936
NC	Asheville, ELCOM	704-298-8709
OH	Beachwood, Thompson & Assoc Inc	216-831-6277
OH	Dayton, Thompson & Assocs Inc	513-435-7733
OH	Orient, Thompson & Assocs Inc	614-877-4304
OR	Beaverton, Comps West, Inc.	503-642-9110
PA	Southampton, Campbell Assoc	215-322-6630
TX	Austin, Impaq Sales Company	512-335-9666
TX	Houston, Impaq Sales Company	713-820-0288
TX	Irving, Impaq Sales Company	214-650-0000
WA	Redmond, Comps West, Inc.	206-885-5880
WI	Brookfield, Heartland Tech Mktg, Inc.	414-789-6860
WI	Milwaukee, Marsh Elctrns Inc	414-475-6000
Can	Ontario, Mississauga, Source Electrns Ltd.	416-676-0830
Can	Ontario, Orleans, Source Electrns Ltd.	613-564-0151
Can	Quebec, Montreal, Source Electrns Ltd.	514-369-0321
Intl	Australia, N. Sydney, Reptechnic	61-2-9539844

Distributors

CA	Camarillo, Milgray Electrns, Inc.	805-484-4055
CA	Irvine, Milgray Electrns, Inc.	714-753-1282
CT	MILFORD, MILGRAY ELECTRONICS, INC.	800-922-6911
CT	Wallingtonford, Cronin Elec, Inc.	203-265-3134
FL	Winter Park, Milgray Electrns, Inc.	800-432-0645, 407-547-5747
GA	Norcross, Milgray Electrns, Inc.	800-241-5523, 404-446-9777
IL	Palatine, Milgray Electrns, Ltd.	708-202-1900
IN	Indianapolis, Meunier Electrn Supply	800-382-9022, 317-635-3511
KS	Overland Park, Milgray Electrns, Ltd.	913-236-9800
MD	Columbia, Migray Electrns, Inc.	800-638-6656, 301-621-8129
MA	Needham, Cronin Electrns, Inc.	617-449-5000
MA	Wilimington, Milgray Electrns, Ltd.	508-657-5900
NH	Manchester, Cronin Electrn, Inc.	603-624-0105
NJ	Marlton, Milgray Electrns, Inc.	609-983-5010
NJ	Parsippany, Milgray Electrns, Inc.	201-335-1766
NY	Farmingdale, Milgray Electrns, Inc.	800-MILGRAY, 516-391-3000
NY	Pittsford, Milgray Electrns, Inc.	716-381-9700
NC	Raleigh, Milgray Electrns, Inc.	800-562-3188, 919-790-8094
OH	Cleveland, Milgray Electrns, Inc.	216-447-1520
TX	Dallas, Milgray Electrns, Inc.	800-627-7227, 214-248-1603
TX	Stafford, Milgray Electrns, Inc.	713-240-5360
UT	Salt Lake City, Milgray Electrns, Inc.	801-272-4999
Can	Ontario, Willowdale, Milgray Electrns, Inc.	800-268-3315, 416-756-4481
Can	Quebec, Pt. Claire, Milgray Electrns, Inc.	514-426-5900
Intl	Australia, Neutral Bay, Reptechnic	61-2-9539844
Intl	Austria, Wien, Hitronik	43-222-824199
Intl	Belgium, Mechelen, Microtron N.V.	32-15212223
Intl	Denmark, Kobenhavn, Advanced Elctrn A/S	45-31-194433
Intl	Finland, Helsinki, OY Fintronic AB	358-0-6926022
Intl	France, Les Ulis Cedex, Microel Immeuble Micro	33-1-69-070824
Intl	Germany, Deisenhofen, Astronic	49-89-6130301
Intl	Germany, Hannover, Topas Elctrn GmbH	49-51-1131217
Intl	Germany, Munich, Scantec Mikroelektronic GmbH	49-89-8598021
Intl	Hong Kong, Kowloon, Leadertronics Co.	852-3890384
Intl	Hong Kong, Kwai Chung, Comps Agent Ltd	852-487-8826
Intl	Isrea, Tirat-Yehuda, El-Gev Elctrns Ltd	972-39712056
Intl	Italy, Milano, MicroElit S.P.A.	39-2-4817900
Intl	Italy, Milano, Silverstar	39-2-661251
Intl	Japan, Tokyo, Nippon Imex Corp	81-3-3321-8000
Intl	Korea, Seoul, ENC Korea	82-2-587-5724
Intl	Netherlands, Microtron N.V.	31-35-61834
Intl	Norway, Oslo, Eltron A/S	47-2-500650
Intl	S. Africa, Eagle Elec Co	27-21-244071
Intl	Singapore, Desner Electrns PTE LTD	011-65-2851566
Intl	Spain, Madrid, Selco	34-1-326-42-13
Intl	Sweden, Solna, Nordqvist & Berg	46-8-7646710
Intl	Switzerland, Zug, Anatec AG	41-42-412441
Intl	Taiwan, R.O.C., Taipei, Helm Engnr & Trading Co.	886-2-709-1888
Intl	United Kingdom, Bucks, Ambar Cascom Ltd.	44-296-434141

SIGNETICS COMPANY, See Philips Semiconductor

SILICOM LIMITED,

900 Corporate Drive, Mahwah,
New Jersey 07430, Tel: 201-529-1100, FAX:
201-529-5777

Sales Office & Representatives

Intl	Israel, Ra anana, Silicom Ltd	972-52-916953

SILICON COMPOSERS, INC.,

208 California
Avenue, Palo Alto, California 94306, Tel: 415-322-8763,
FAX: 415-322-8778

SILICON CONNECTIONS CORP.,

16868 Via Del
Campo Court, San Diego, California 92127, Tel:
619-674-1050, FAX: 619-674-1218

Sales Office & Representatives

CA	Aliso Viejo, Pro Assoc	714-588-2700
CA	Santa Clara, I Squared, Inc.	408-988-3400
MA	Burlington, Anacon Sales Assoc., Inc.	617-272-9080
TX	Dallas, Momentum Mktg INc.	214-241-3505
Intl	Japan, Kanagawa-Ken, Int'l Business Connectionss	0427-40-5490
Intl	Japan, Tokyo, Sys Mktg, Inc.	03-3254-2751
Intl	Taiwan, Taipei, ROC, Taiwan Ei-En Enterprise Co. Ltd.	02-322-5970

SILICON GENERAL SEMICONDUCTORS,

See Linfinity Microelectronics

SILICON SYSTEMS INC.,

14351 Myford Road,
Tustin, California 92680, Tel: 714-731-7110, TWX:
910-595-2809, FAX: 714-669-8814

Sales Office & Representatives

AL	Huntsville, Technology Mktg Assocs., Inc. (TMA)	205-883-7893
AZ	Scottsdale, Western High Tech Mktg, Inc.	602-860-2702
CA	San Diego, Hadden Assocs	619-565-9444
CA	San Jose, Silicon Sys, (Northwest H.Q.)	408-453-7811
CA	Santa Clara, Magna Sales	408-727-8753
CA	Thousand Oaks, SC Cubed	805-496-7307
CA	Tustin, Silicon Sys, Inc	714-832-5310
CA	Tustin, SC Cubed	714-731-9206
CO	Boulder, Silicon Sys, Inc (Southwestern H.Q.)	303-440-9780
CO	Colorado Springs, Lange Sales	719-632-8340
CO	Littleton, Lange Sales	303-795-3600
CO	Wheat Ridge, Aved, Inc	303-422-1701
CT	Nu Horizons	203-265-0162
CT	Southington, Orion Group	203-621-8371
FL	Deerfield Bch, Technology Mktg Assocs., (TMA)	305-427-1090
FL	Largo, Technology Mktg Assocs., (TMA)	813-531-4405
FL	Orlando, Technology Mktg Assocs., (TMA)	407-671-2245
GA	Silicon Sys, Inc	404-409-8405
GA	Norcross, Technology Mktg Assocs., (TMA)	404-446-3565
ID	Boise, Western Tech Sales	208-376-8700
ID	Boise, Lange Sales	208-323-0713
IL	Itasca, Circuit Sales, Inc.	708-773-0200
IN	Ft. Wayne, Arete Sales, Inc.	219-423-1478
IN	Kokomo, Micro Comps, Inc	317-454-6988
IA	Cedar Rapids, Cahill, Schmitz & Howe	319-377-8219
IA	Davenport, Rush & West Assocs., Inc	319-388-9494
KS	Olathe, Rush & West Assocs., Inc	913-764-2700
MD	Baltimore, Burgin-Kreh Assocs., Inc.	410-265-8500
MA	Woburn, Mill-Bern Assocs	617-932-3311
MI	Bloomfield Hills, Trilogy Mktg. Inc.	313-338-2470
MN	Minneapolis, OHMS Technology, Inc.	612-932-2920
MO	St. Louis, Rush & West Assocs., Inc	314-965-3322
NH	Salem, Silicon Sys, Inc. (Eastern H.Q.)	603-898-1444
NJ	West Caldwell, Tech Mktg Group	201-226-3300
NM	Albuquerque, Western High Tech Mktg., Inc	505-884-2256
NY	E. Syracuse, Electra Sales	315-463-1248
NY	Melville, Tech Mktg Group	516-351-8833
NY	Rochester, Electra Sales	716-427-7860
NC	Raleigh, Technolgy Mktg., Assocs. (TMA)	919-872-5104
OH	Cincinatti, Makin Assocs	513-871-2424
OH	Dublin, Makin Assocs	614-793-9545
OH	Solon, Makin Assocs	216-248-7370
OR	Beaverton, Western Tech Sales	503-644-8860
PA	Erdenheim, Omni Sales	215-233-4600

TX	Austin, OM Assocs., Inc.	512-794-9971
TX	Houston, OM Assocs., Inc.	713-789-4426
TX	Richardson, OM Assocs., Inc.	214-690-6746
UT	Salt Lake City, Lange Sales	801-487-0843
WA	Bellevue, Western Tech Sales	206-641-3900
WA	Spokane, Western Tech Sales	509-922-7600
WI	Brookfield, Circuit Sales, Inc.	414-784-7773
Can	B.C., Richmond, Enerlec Sales	604-273-0882
Can	Ont., Downsview, Har-Tech Elctrns. Ltd.	416-660-3419
Can	Ont., Nepean, Har-Tech Elctrns. Ltd.	613-726-9410
Can	Que., Pointe Claire, Har-Tech Elctrns. Ltd.	514-694-6110
Intl	England, Brookshire, Magna Technlg	44-73-488-0211
Intl	Mexico, Guadalajara, SONIKA	52-36-474250
Intl	Mexico, Mexico City, SONIKA	52-5-754-6480

Distributors

AL	Huntsville, Hamilton/Hall-Mark	205-837-8700
AL	Huntsville, Nu Horizons	205-722-9930
AZ	Phoenix, Aved, Inc	602-951-9788
AZ	Phoenix, Hamilton/Hall-Mark	602-437-1200
CA	Costa Mesa, Hamilton/Hall-Mark	714-641-4100
CA	Los Angeles, Hamilton/Hall-Mark	818-773-4500
CA	Sacramento, Hamilton/Hall-Mark	916-624-9781
CA	San Diego, Western Microtechnology	619-453-8430
CA	San Diego, Hamilton/Hall-Mark	619-751-7540
CA	San Diego, Aved, Inc.	619-558-8890
CA	San Jose, Hamilton/Hall-Mark	408-432-4000
CA	Saratoga, Western Microtechnology	408-725-1660
CA	Tustin, Aved, Inc.	714-259-8258
CO	Englewood, Hamilton/Hall-Mark	303-790-1662
CT	Cheshire, Hamilton/Hall-Mark	203-271-2844
FL	Ft. Lauderdale, Nu Horizons	305-735-2555
FL	Ft. Lauderdale, Hamilton/Hall-Mark	305-484-5482
FL	St. Petersburg, Hamilton/Hall-Mark	813-541-7440
GA	Norcross, Hamilton/Hall-Mark	404-623-4400
GA	Norcross, Nu Horizons	404-416-8666
IL	Bensenville, Hamilton/Hall-Mark	708-860-3800
IN	Indianapolis, Hamilton/Hall-Mark	317-872-8875
KS	Lenexa, Hamilton/Hall-Mark	913-888-4747
MD	Columbia, Hamilton/Hall-Mark	410-988-9800
MD	Columbia, Nu Horizons	410-995-6330
MA	Nu Horizons	617-246-4442
MA	Peabody, Hamilton/Hall-Mark	508-532-3701
MI	Detroit, Hamilton/Hall-Mark	313-416-5800
MN	Bloomington, Hamilton/Hall-Mark	612-881-2600
MO	St. Louis, Hamilton/Hall-Mark	314-291-5350
NJ	Fairfield, Hamilton/Hall-Mark	201-515-3000
NJ	Mount Laurel, Nu Horizons	609-231-0900
NJ	No. Jersey, Hamilton/Hall-Mark	609-751-2520
NJ	Pine Brook, Nu Horizons	201-882-8300
NY	Rochester, Hamiton/Hall-Mark	716-475-9130
NY	Ronkonkoma, Hamilton/Hall-Mark	516-737-0600
NC	Raleigh, Hamilton/Hall-Mark	919-872-0712
OH	Solon, Hamilton/Hall-Mark	216-349-4632
OH	Worthington, Hamilton/Hall-Mark	614-888-3313
OK	Tulsa, Hamilton/Hall-Mark	918-254-6110
OR	Beaverton, Western Microtechnology	503-629-2082
PA	Nu Horizons	215-557-6450
TX	Austin, Hamilton/Hall-Mark	512-258-8848
TX	Dallas, Hamilton/Hall-Mark	214-553-4300
TX	Houston, Hamiton/Hall-Mark	713-781-6100
UT	Salt Lake City, Aved, Inc.	801-975-9500
WA	Redmond, Western Microtechnology	206-828-2741
WI	New Berlin, Hamilton/Hall-Mark	414-797-7844
Can	B. C., Surrey, Enerlec	604-273-0882
Can	Ont., Downsview, Har-Tech Elctrns	416-660-3419
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Intl	Chile, Santiago Centro, Victronics, Ltd	56-2-633-0237, 56-2-633-2787
Intl	Denmark, Kokkedal, C-88	45-4224-4888
Intl	England, Siretta Microelec Ltd	44-73-475-6121
Intl	England, Essex, Pronto Elctrn Sys Ltd.	44-81-554-6222
Intl	England, Middlesex, Silicon Sys Intl (H.Q.)	44-81-443-7061
Intl	Finland, Espoo, Oy Bexab Finn-Crimp Ab	358-0-5023200
Intl	France, Rungis, MISIL	33-1-45-60-00-21
Intl	Germany, Hamburg, Atlantik Elektronik GmbH	49-40-241-072
Intl	Germany, Munich, Atlantik Elektronik GmbH	49-89-857-0000
Intl	Greece, Athens, Peter Caritato & Assocs. Ltd.	30-1-902-0115
Intl	Hong Kong, Wanchai, CET, Ltd	852-520-0922
Intl	Ireland, Limerick, Memec Ireland, Ltd	353-61-411842
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Intl	Japan, Tokyo, Internix	81-3-3369-1105
Intl	Korea, Seoul, Hanaro Corp	82-2-516-1144
Intl	Malaysia, Penang, Dynamar Computer Prods.	604-281860
Intl	Netherlands, Alcom Elctrns BV	31-10-451-9533
Intl	New Zealand, Wellington, Apex Elctrns Ltd.	64-4-3878-551, 64-4-387-8552
Intl	Norway, Asker, Hans H. Schive	47-66-900-900
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Intl	Spain, Madrid, Amitron, S.A.	34-1-542-09-06
Intl	Sweden, Taby, Bexab Technology AB	46-8-630-8800
Intl	Switzerland, Zurich, Ellyptic AG	41-1-493-1000
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Intl	Thailand, Bangkok, Dynamar Computer Products	662-376-0132
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CA	Agoura, Quadrep Southern, Inc	714-727-4222
CA	Irvine, Quadrep Southern, Inc	714-727-4222
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CA	San Diego, Quadrep Southern, Inc	619-755-1188
CA	San Jose, Quadrep, Inc	408-432-3300
CA	Santa Clara, TEMIC Grp	408-970-5700
CA	Santa Clara, TEMIC Grp	408-970-5700, 1-800-554-5565
CO	Longmont, Quadrep, Inc	303-682-9805
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IA	Cedar Rapids, Midwest Tech Sls	319-377-1688
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KS	Lenexa, Midwest Tech Sls	913-888-5100
MD	Annapolis, Parogem, Inc	301-269-1898
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MN	Bloomington, High Tech Sls Assocs	612-844-9933
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Intl	Japan, Tokyo, AEG	81-3-3578-0823
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Intl	Sweden, Siliconix, LTD	46-08-733-2500
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AZ	Chandler, Hamilton/Avnet	602-961-6400
AZ	Phoenix, Future Elctrns Corp	602-968-7140
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AZ	Phoenix, Wyle Labs-EMG	602-437-2088
AZ	Tempe, Bell Inds	602-966-7800
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CA	Agoura Hills, Bell Inds	818-879-9494
CA	Calabasas, Wyle Labs	818-880-9000
CA	Calabasas, Marshall Inds	818-878-7000
CA	Chatsworth, Future Elctrns Corp	818-772-6240
CA	Costa Mesa, Hamilton/Avnet	714-641-4100
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CA	Irvine, Marshall Inds	714-859-5050
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CA	Milpitas, Marshall Inds	408-942-4600
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CA	Rancho Cordova, Wyle Dist	916-638-5282
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CA	San Diego, Future Elctrns Corp	619-625-2800
CA	San Diego, Hamilton/Avnet	619-571-7540
CA	San Diego, Marshall Inds	619-627-4140
CA	San Diego, Wyle Labs-EMG	619-565-9171
CA	San Diego, Bell Inds	619-268-1277
CA	San Jose, Future Elctrns Corp	408-434-1122
CA	San Jose, Zeus Comps	408-629-4789
CA	Santa Clara, Wyle Dist	408-727-2500
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CA	Sunnyvale, Hamilton/Avnet	408-743-3300

CA	Woodland Hills, Hamilton/Avnet	818-594-0404
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FL	Altamonte Springs, Bell Inds	407-339-0078
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GA	Norcross, Marshall Inds	404-923-5750
GA	Norcross, Bell Inds	404-446-7167
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IL	Hoffman Estates, Future Elctrns Corp	708-882-1255
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IN	Indianapolis, Bell Inds	317-875-8200
IN	Indianapolis, Pioneer Std	317-573-0880
IA	Cedar Rapids, Hamilton/Avnet	319-393-0033
KS	Lenexa, Marshall Inds	913-492-3121
KS	Lenexa, Hamilton/Avnet	913-888-1055
KY	Lexington, Hamilton/Avnet	606-259-1475
MD	Andover, Bell Inds	508-474-8880
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MD	Columbia, Hamilton/Avnet	301-995-3500
MD	Columbia, Zeus Comps	301-997-1118
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MD	Gaithersburg, Pioneer Tech	301-921-0660
MD	Silver Springs, Marshall Inds	301-622-1118
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MA	Burlington, Wyle	617-272-7300
MA	Lexington, Pioneer Std	617-861-9200
MA	Peabody, Hamilton/Avnet	508-531-7430
MA	Wakefield, Zeus Comps	617-246-8200
MA	Wilmington, Marshall Inds	508-658-0810
MI	Grand Rapids, Pioneer Std	616-698-1800
MI	Livonia, Future Elctrns Corp	313-261-5270
MI	Livonia, Marshall Inds	313-525-5850
MI	Livonia, Pioneer Std	313-525-1800
MI	Novi, Hamilton/Avnet	313-347-4270
MI	Novi, Hamilton/Avnet	313-347-4271
MN	Eden Prairie, Future Elctrns Corp	612-944-2200
MN	Eden Prairie, Pioneer Std	612-944-3355
MN	Minnetonka, Hamilton/Avnet	612-932-0678
MN	Plymouth, Marshall Inds	612-559-2211
MO	Bridgeton, Marshall Inds	314-291-4650
MO	Chesterfield, Hamilton/Avnet	314-537-4265
MO	St. Louis, Future Elctrns Corp	314-469-6805
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NJ	Fairfield, Hamilton/Avnet	201-575-3390
NJ	Fairfield, Marshall Inds	201-882-0320
NJ	Fairfield, Pioneer Std	201-575-3510
NJ	Fairfield, Bell Inds	201-227-6060
NJ	Marlton, Future Elctrns Corp	609-596-4080
NJ	Mt. Laurel, Marshall Inds	609-234-9100
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NM	Albuquerque, Hamilton/Avnet	505-345-0001
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NY	Endicott, Marshall Inds	607-798-1611
NY	Fairport, Pioneer Std	716-381-7070
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NY	Hauppauge, Hamilton/Avnet	516-434-7470
NY	N. Syracuse, Hamilton/Avnet	315-437-2642
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NY	Rochester, Future Elctrns Corp	716-272-1120
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NY	Rochester, Marshall Inds	716-235-7620
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NC	Charlotte, Pioneer Tech	704-527-8188
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OH	Dayton, Hamilton/Avnet	513-439-6721
OH	Dayton, Marshall Inds	513-898-4480
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OH	Dayton, Bell Inds	513-434-8231
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OH	Solon, Marshall Inds	216-248-1788
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OK	Tulsa, Pioneer	918-665-7840
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OR	Beaverton, Hamilton/Avnet	503-526-6200
OR	Beaverton, Marshall Inds	503-644-5050
OR	Beaverton, Wyle Labs-EMG	503-643-7900
OR	Beaverton, Bell Inds	503-644-1500
PA	Bristol, Bell Inds	215-788-5000
PA	Horsham, Pioneer Tech	215-674-4000
PA	Mars, Hamilton/Avnet	412-281-4150
PA	Pittsburgh, Marshall Inds	412-788-0441
PA	Pittsburgh, Pioneer Std	412-782-2300
PA	Trevose, Bell Inds	215-953-2800
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TX	Austin, Pioneer Std	512-835-4000
TX	Austin, Wyle Dist	512-345-8853
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TX	Dallas, Pioneer Std	214-386-7300
TX	Houston, Future Elctrns Corp	713-556-8696
TX	Houston, Marshall Inds	713-467-1666
TX	Houston, Pioneer Std	713-495-4700
TX	Houston, Wyle Dist	713-879-9953
TX	Houston, Hamilton/Avnet	713-861-8517
TX	Richardson, Marshall Inds	214-705-0604
TX	Richardson, Future Elctrns Corp	214-437-2437
TX	Richardson, Wyle Dist	214-235-9953
TX	Richardson, Zeus Comps	214-783-7010
TX	Richardson, Bell Inds	214-690-0466
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UT	Salt Lake City, Marshall Inds	801-485-1551
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WA	Bothell, Future Elctrns	206-489-3400
WA	Redmond, Hamilton/Avnet	206-881-6697
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WA	Redmond, Bell Inds	206-867-5410
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WI	Waukesha, Future Elctrns Corp	414-786-1884
WI	Waukesha, Hamilton/Avnet	414-784-4511
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Intl	Switzerland, Schlieren, Abalec A.G.	01-730-0455

Intl	Switzerland, Vorstadstr, EBV Elektronik	01-7401090
Intl	Taiwan, Taipei, Dynamar Taiwan Co Ltd	886-02-7775670
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Sales Office & Representatives

AL	Huntsville, M-Squared, Inc	205-839-0498
AZ	Phoenix, Compass Mktg & Sls	602-996-0635
CA	Anaheim, Westrep	714-527-2822
CA	San Diego, Westrep	619-674-1880
CA	San Jose, Simtek (Western Area)	408-432-7235
CA	Santa Clara, Westrep	408-988-8833
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CT	Woodbury, Lindco Assocs	203-266-0728
FL	Boca Raton, Perrott Assocs., Inc	407-362-0191
FL	Casselberry, Perrott Assocs. Inc	407-830-0094
FL	Melbourne, Perrott Assocs., Inc	407-676-0305
GA	Norcross, M-Squared, Inc	404-447-6124
IL	Schaumburg, Martan, Inc	708-303-5660
IN	Indianapolis, Mohrfield Mktg, Inc	317-546-6969
KS	Olathe, Tech Sls. Assocs	913-829-2800
MD	Burtonsville, Chesapeake Technlg	301-236-0530
MA	Tewksbury, A/D Sales	508-851-5400
MN	Eden Prairie, Aldridge Assocs., Inc.	612-944-8433
MO	St. Louis, Tech Sls. Assocs	314-521-2044
NJ	Teaneck, Strategic Sls Inc	201-833-0099
NM	Albuquerque, Compass Mktg & Sls	505-344-9990
NY	Dewitt, ICS/Lamtec	315-445-9600
NC	Raleigh, M-Squared, Inc	919-851-0010
OH	Columbus, Dolfuss-Root & Co	614-885-4844
OH	Dayton, Dolfuss-Root & Co	513-433-6776
OH	Westlake, Dolfuss-Root & Co	216-899-9370
OR	Beaverton, Advanced Tech Mktg Inc	503-643-8307
PA	Warrington, Strategic Sls	215-491-0340
TX	Austin, Synergistic Sls	512-346-2122
TX	Houston, Synergistic Sls	713-937-1990
TX	Richardson, Synergistic Sls Inc	214-644-3500
UT	Salt Lake City, Compass Mktg & Sls	801-322-0391
WA	Redmond, Advanced Tech Mktg Inc	206-869-7636
WI	Mequon, Martan, Inc	414-241-4955
Can	Ont., Concord, Har-Tech Elctrn. Ltd.	416-660-3419
Can	Ont., Nepean, Har-Tech Elctrns Ltd	613-726-9410
Can	Que., Pointe Claire, Har-Tech Elctrns, Inc	514-694-6110
Intl	Australia, Neutral Bay NSW, Reptechnic	2-953-9844
Intl	Belgium, Kontich, Alcom Elctrns	3458-3033
Intl	England, Bristol, Simtek Corp	0272-49-7762
Intl	Finland, Espoo, Yleiselektroniikka Oy	90-452621
Intl	Holland, Alcom Elctrns BV	10-451-9533
Intl	India, Bangalore, Aarjhy Elctrns Pvt. Ltd	080-592874
Intl	Israel, Tirat-Yehuda, Elgev Elctrns	03-971-2056
Intl	Singapore, Tri-Tech Microelec Intl	778-8211
Intl	Taiwan, Taipei ROC, Tri-Tech Microelec	2-761-8555
Intl	Taiwan, Thsien ROC, Ultra Source	2-999-1333

Distributors

CA	Agoura Hills, Western Micro Technlg	818-707-0731
CA	Orange, Western Micro Technlg	714-637-0200
CA	San Diego, Western Micro Technlg	619-453-8430
CA	San Jose, Zeus Comps	408-629-4789
CA	San Jose, Merit Elctrns	408-434-0800
CA	Saratoga, Western Micro Technlg	408-725-1660
CA	Yorba Linda, Zeus Comps	714-921-9000
CT	Danbury, Phase 1 Technlg	203-791-9042
FL	Altamonte Springs, Vantage Comps	407-682-1199
FL	Lake Mary, Zeus Comps	407-333-3055
MD	Columbia, Vantage Comps	410-720-5100
MA	Billerica, Vantage Comps	508-667-2400
MA	Burlington, Western Micro Technlg	617-273-2800
MA	Shewsbury, Phase 1 Technlg	503-366-3999
MA	Wilmington, Zeus Comps	508-658-4776
NJ	Clifton, Vantage Comps	201-777-4100
NJ	Elmwood Park, Phase 1 Technlg	201-791-2990
NJ	Marlton, Western Micro Technlg	609-596-7775
NY	Deer Park, Phase 1 Technlg	516-254-2600
NY	Port Chester, Zeus Comps	914-937-7400
NY	Smithtown, Vantage Comps	516-543-2000
OR	Beaverton, Western Micro Technlg	503-629-2082
TX	Carrollton, Zeus Comps	214-380-4330
WA	Kirkland, Western Micro Technlg	206-828-2741
Intl	Denmark, Gladsaxevef, Scan Supply A/S	39-66-50-90
Intl	France, Sevres Cedex, Tekelec Airtronic	1-46-23-24-25
Intl	Germany, Hannover, Topas Elctrns GmbH	0511-13-12-17
Intl	Germany, Planegg, Scantec GmbH	089-859-8021
Intl	Israel, Herzlia, Vectronics Ltd	52-226070
Intl	Italy, Milan, LASI Elettronica SPA	2-66-101-370
Intl	Japan, Yokohama City, Altima Corp	45-939-6113
Intl	Korea, Seoul, Tri-Tech Korea	2-571-5781
Intl	Norway, Lysaker, Jakob Hatteland Electrn	4-76-3000
Intl	Spain, Madrid, ADM Electrna SA	1-530-4121
Intl	Sweden, Solna, NC NordComp Sweden AB	8-764-6710
Intl	U.K., England, Essex, Pronto Elctrn Sys	81-554-6222

SIPEX CORPORATION, 22 Linnell Circle, Billerica,
Massachusetts 01821, Tel: 508-667-8700, FAX:
508-670-9001

Sales Office & Representatives

AL	Huntsville, EMA	205-830-4030
AZ	Phoenix, Southwest Tech Sales	602-893-1209
CA	Carlsbad, Addem	619-729-9216
CA	Milpitas, Talon Megasales	408-956-5888
CA	San Juan Capistrano, Sipex Corp	714-248-4884
CO	Parker, Parker Webster Company	303-841-4888
FL	Boynton Bch, Electro-Craft Inc	407-394-9686
FL	Largo, Electro-Craft Inc	813-544-1766
GA	Roswell, EMA	404-992-7240
IL	Arlington Hgts., Torkelson Assoc	708-670-0710
IL	Buffalo Grove, Torkelson Assoc	708-520-0710
IN	Indianapolis, Torkelson Assos	317-244-7867
MD	Pasadena, EES	410-255-9686
MI	Plymouth, Jay Mktg Assoc.	313-459-1200
MN	Minneapolis, Torkelson Assoc	612-835-2414
NJ	Fairfield, Phase 4	201-575-4343
NY	Rochester, Micro-Tech Mktg	716-426-0806
NC	Burlington, EMA	919-227-1832
NC	Charlotte, EMA	704-365-0547
NC	Raleigh, EMA	919-846-6888
OH	Brunswick, J.N. Bailey & Assoc.	216-273-3798
OH	Columbus, J.N.Bailey & Assoc	614-262-7274
OH	New Lebanon, J.N. Bailey & Assoc.	513-687-1325
OR	Beaverton, Blair-Hirsh Co	503-641-1875
PA	Horsham, Nexus Technology Sales	215-675-9600
TX	Austin, MREP	512-250-0828
TX	Dallas, MREP	214-484-5711
UT	Murray, Parker Webster Company	801-266-9939
WA	Lynnwood, Blair-Hirsh Co	206-774-8151
WI	Waukesha, Torkelson Assoc	414-784-7736
Can	Ontario, Mississauga, Source Electrns Ltd	416-676-0830
Intl	Australia, Dingley, Victoria, R & D Electrns	61-3-558-0444
Intl	Denmark, Supply-Team	45-42-902333
Intl	England, Odiham Hampshire, MB Comps Ltd	44-256-703032
Intl	Finland, Espoo, SW-Instrs OY AB	358-0-522-122
Intl	France, Rungis Cedex, Sipex S.A.R.L.	33-1-46-87-8336
Intl	Germany, Starnberg, Sipex GmbH	49-8151-89810
Intl	Hong Kong, Sheung Wan, Electrn Scientific Eng Ltd	852-559-2041
Intl	Israel, Azur, Seg Tec	972-3-556-7458
Intl	Italy, Milano, Celte S.R.L.	39-2-236-7602
Intl	Japan, Shinjuku-ku Tokyo, Nippon Sipex Corp.	81-3-3266-8585
Intl	Korea, Seoul, Sunho Corp.	822-558-4415
Intl	Netherlands, Hertogenbosch, Maxtronix	31-73-210400
Intl	Spain, Madrid, Anatronic S.A.	34-1-542-4455
Intl	Taiwan, Taipei, Panchiao ROC, Kaltec Int'l Ltd.	886-2-255-5711

Distributors

AL	Huntsville, Future Elctrns	205-830-2322
AZ	Phoenix, Future Elctrns	602-968-7140
CA	Carlsbad, Aegis Electrns Group	619-729-2026
CA	Chastworth, Future Elctrns	818-772-6240
CA	Irvine, ITT Multicomponents	714-727-4001
CA	Irvine, Future Elctrns	714-250-4141
CA	Los Alamitos, Semi-Dice, Inc.	310-594-4631
CA	Reseda, Jan Devices	818-708-1100
CA	San Diego, Future Elctrns	619-625-2800
CA	San Jose, ITT Multicomponents	408-453-1404
CA	San Jose, Future Elctrns	408-434-1122
CO	Lakewood, Future Elctrns	303-232-2008
CT	Bethel, Future Elctrns	203-743-9594
FL	Altamonte Springs, Future Elctrns	407-767-8414
FL	Largo, Future Elctrns	813-530-1222
GA	Norcross, Future Elctrns	404-441-7676
IL	Hoffman Estates, Future Elctrns	708-882-1255
IL	Schaumburg, Marsh Electrns	708-240-9290
IN	Indianapolis, Custom Service Electrns	317-879-9119
MD	Columbia, Future Elctrns	410-290-0600
MA	Bolton, Future Elctrns	508-779-3000
MA	Norwood, Gerber Electrns	617-769-6000
MA	Wilmington, North Star Electrns	508-657-5155
MI	Grand Rapids, Calder Electrns	616-698-7400
MI	Grand Rapids, Future Elctrns	616-249-3200
MI	Livonia, Future Elctrns	313-261-5270
MN	Eden Prairie, Future Elctrns	612-944-2200
MN	Fridley, Voyager II	612-571-7766
MN	Minneapolis, Marsh Electrns	612-831-4840
MO	St. Louis, Future Elctrns	314-469-6805
NJ	Marlton, Future Elctrns	609-596-4080
NJ	Parsippany, Future Elctrns	201-299-0400
NY	Hauppauge, Future Elctrns	516-234-4000
NY	Rochester, Future Elctrns	716-272-1120
NY	Syracuse, Future Elctrns	315-451-2371
NC	Concord, Future Elctrns	704-455-9030
NC	Raleigh, Future Elctrns	919-790-7111
OH	Mayfield Hgts., Future Elctrns	216-449-6996
OR	Beaverton, Future Elctrns	503-645-9454
OR	Portland, Radar Elec	503-232-3404
TX	Austin, Future Elctrns	512-502-0991
TX	Carrollton, Omni Pro	214-233-0500
TX	Houston, Omni Pro	713-270-1700
TX	Houston, Future Elctrns	713-556-8696
TX	Richardson, Future Elctrns	214-437-2437
UT	Salt Lake City, Future Elctrns	801-972-8489
WA	Bothell, Future Elctrns	206-489-3400
WA	Richland, Radar Elec	509-943-8336
WA	Seattle, Radar Elec	206-282-2511
WA	Spokane, Radar Elec	509-747-3050
WI	Milwaukee, Marsh Electrns	414-475-6000
WI	Waukesha, Future Elctrns	414-786-1884

SOLARISE ENTERPRISES INC., 12280 So.
Saratoga-Sunnyvale, Saratoga, California 95070, Tel:
408-446-9343

SOLITRON DEVICES, INC., Semiconductor Group,
3301 Electronics Way, West Palm Beach, Florida
33407-4697, Tel: 407-848-4311, FAX: 407-863-5946

Sales Office & Representatives

AZ	Tempe, Piper Sls. Co.	602-949-0048
CO	Aurora, Piper Sls. Co.	303-340-1300
CT	Washington, Tri-Com Assocs.	203-868-7027
MA	Burlington, Tri-Com Assocs.	617-272-8163
NM	Albuquerque, Piper Sls. Co.	505-828-1300

TX	Plano, Zeus Engnr	214-423-2027
UT	Salt Lake City, Piper Sls. Co.	801-466-9336

Distributors

CA	Burbank, Elmo Semiconductors	818-768-7400
CA	Centerville, Koehlke Comps., Inc.	513-435-5435
CA	San Jose, All American Semiconductor, Inc.	408-943-1200
CA	Torrance, All American Semiconductor, Inc.	310-320-0240
CA	Walnut, ACI Electrns Corp.	714-594-1731
CT	Killingworth, ACI Electrns Corp.	203-663-3311
FL	Miami, All American Semiconductor, Inc.	305-621-8282
FL	Sunrise, All American Semiconductor, Inc.	305-572-7999
MD	Rockville, All American Semiconductor, Inc.	301-251-1205
MA	Wakefield, All American Semiconductor, Inc.	617-246-2300
MA	Woburn, ACI Electrns Corp.	617-935-7230
MN	Eden Prairie, All American Semiconductor, Inc.	612-944-2151
NJ	Totowa, ACI Electrns Corp.	201-812-0507
NY	Plainview, ACI Electrns Corp.	516-293-6630
NY	Ronkonkoma, All American Semiconductor, Inc.	516-981-3935
TX	Richardson, All American Semiconductor,Inc.	214-231-5300

SONY®

FAX: 714-229-4333

SONY CORPORATION OF AMERICA, Sony
Component Products, 10833 Valley View Street, Cypress,
California 90630, Tel: 714-229-4442, FAX: 714-229-4333

Sales Office & Representatives

AL	Huntsville, Rep, Inc.	205-881-9270
AK	Sony	408-955-4314
AZ	Reptronix	602-230-2630
AR	B-P Sales	214-234-8438
CA	Cypress, Sony Corp. of America (Southwest)	714-229-4442
CA	Los Angeles, H-Tech Sales	714-753-7810
CA	Sacramento, Parsons Tech	916-965-3255
CA	San Diego, Addem Sales	619-729-9216
CA	San Jose, Sony Corp of America (Northwest)	408-955-4314
CO	Comp Sales	303-779-8060
CT	S-J Assoc	203-458-7558
DE	S-J Assoc.	703-533-2233
DC	S-J Assoc.	703-533-2233
FL	Sigma Tech Assoc	813-789-5522
GA	Rep, Inc.	404-938-4358
HI	Parsons	916-965-3255
ID	Electrodyne	801-264-8050
ID	Northwest Comp	206-828-2104
IL	Micro-Tex, Inc.	708-765-3000
IL	Sony	708-773-7667
IL	Itasca, Sony Corp. of America (Central)	708-773-7667
IN	Giesting	317-844-5222
IA	JR Sales	319-393-2232
KS	Sony	708-773-7667
KY	Giesting	606-873-2330
LA	B-P Sales	214-234-8438
ME	S-J Assoc	617-272-5552
MD	S-J Assoc.	703-533-2233
MA	S-J Assoc	617-272-5552
MA	Newton, Sony Corp. of America (Northeast)	617-630-8812
MI	Giesting	313-478-8106
MN	Vector Sales	612-631-1334
MS	Rep, Inc.	205-881-9270
MO	Sony	708-773-6072
MT	Electrodyne	801-264-8050
MT	Northwest Comp	206-828-2104
NE	Vector Sales	612-631-1334
NV	Parsons	916-965-3255
NV	Reptronix	602-230-2630
NH	S-J Assoc	617-272-5552
NJ	S-J Assoc.	516-536-4242
NJ	S-J Assoc	609-866-1234
NM	Reptronix	505-292-1718
NY	S-J Assoc	716-394-3281
NY	S-J Assoc	516-536-4242
NC	Rep, Inc.	919-469-9997
NC	Morrisville, Sony Corp. of America (Southeast)	919-380-0786
ND	Vector Sales	612-631-1334
OH	Cincinnati, Giesting	513-385-1105
OH	Cleveland, Giesting	216-261-9705
OK	B-P Sales	214-234-8438
OR	Northwest Comps	503-620-3285
PA	S-J Assoc.	609-866-1234
PA	Pittsburgh, Giesting	412-828-3553
RI	S-J Assoc	617-272-5552
SC	Rep Inc	919-469-9997
SD	Vector Sales	612-631-1334
TN	Jefferson City, Rep, Inc.	615-475-4105
TX	Austin, B-P Sales	512-346-9186
TX	Dallas, B-P Sales	214-234-8438
TX	El Paso County, Reptronix	505-292-1718
TX	Houston, B-P Sales	713-782-4144
UT	Salt Lake City, Electrodyne	801-264-8050
VT	S-J Assoc	617-272-5552
VA	S-J Assoc	703-533-2233
WA	Northwest Comp	206-284-6376
WV	Giesting	513-385-1105
WI	Vector Sales	612-631-1334
WI	Micro-Tex, Inc.	414-542-5352
WY	Comps Sales	303-779-8060
Can	Ontario, Willowdale, Sony of Canada, Ltd.	416-499-1414

Distributors

AL	Huntsville, Marshall Ind.	205-881-9235
AZ	Phoenix, Marshall Ind.	602-496-0290
CA	El Monte, Marshall Ind. (Headquarters)	818-307-6000
CA	Ftn. Valley, Bell Micro	714-963-0667
CA	Irvine, Marshall Ind.	714-458-5395
CA	Irvine, Milgray Electrns	714-753-1282
CA	Los Angeles, Western Micro	818-707-0377
CA	Los Angeles, Marshall Ind.	818-878-7000
CA	Los Angeles, Milgray Electrns	800-635-7812
CA	Orange, Western Micro	714-637-0200
CA	Sacramento, Marshall Ind.	916-635-9700
CA	San Diego, Marshall Ind.	619-627-4140
CA	San Diego, Western Micro	619-453-8430
CA	San Francisco, Marshall Ind.	408-942-4600
CA	San Jose, Merit Electrns, Inc.	408-434-0800
CA	San Jose, Bell Micro	408-451-9400
CA	Saratoga, Western Micro	408-725-1660
CA	Westlake Village, Bell Micro	805-496-2606
CO	Denver, Marshall Ind.	303-451-8444
CT	Danbury, Phase I	203-791-9042
CT	Milford, Milgray Elctrns	800-922-6911, 203-878-5538
CT	Wallingford, Marshall Ind.	203-265-3822
FL	Deerfield, Vantage Comps	305-429-1001
FL	Ft. Lauderdale, Marshall Ind.	305-977-4880
FL	Lake Mary, Milgray Electrns	800-367-0780, 407-321-2555
FL	Orlando, Marshall Ind.	407-767-8585
FL	Tampa, Marshall Ind.	813-576-1399
GA	Atlanta, Marshall Ind.	404-923-5750
GA	Norcross, Milgray Electrns	800-241-5523, 404-446-9777
IL	Chicago, Milgray Electrns	708-202-1900
IL	Chicago, Marshall Ind.	708-490-0155
IN	Indianapolis, Marshall Ind.	317-297-0483
KS	Kansas City, Marshall Ind.	913-492-3121
KS	Overland Park, Milgray Electrns	913-236-8800
MD	Columbia, Milgray Electrns	800-638-6656, 410-621-8169
MD	Columbia, Vantage Comps	410-720-5100
MD	Silver Springs, Marshall Ind.	301-622-1118
MA	Billerica, Vantage	508-667-2400
MA	Boston, Marshall Ind.	508-658-0810
MA	Burlington, Western Micro	800-345-2921, 617-273-2800
MA	Wilmington, Milgray Electornics	508-657-5900
MI	Livonia, Marshall Ind.	313-525-5850
MN	Minneapolis, Marshall Ind.	612-559-2211, 612-559-1014
MO	St. Louis, Marshall Ind.	314-291-4650
NJ	Clifton, Vantage Comps	201-777-4100
NJ	Elmwood Park, Phase I	201-791-2990
NJ	Fairfield, Marshall Ind.	201-882-0320
NJ	Marlton, Milgray Electrns	800-257-7111, 609-983-5010
NJ	Mt. Laurel, Marshall Ind.	609-234-9100
NJ	Parsippany, Milgray Electrns	201-335-1766
NJ	West Berlin, GCI	609-768-6767
NY	Binghamton, Marshall Ind.	607-798-2345
NY	Deer Park, Phase I	516-254-2600
NY	Farmingdale, Milgray Electrns	800-MILGRAY, 516-420-9800
NY	Hauppauge, Marshall Ind.	516-273-2424
NY	Pittsford, Milgray Electrns	716-834-9405, 716-381-9700
NY	Rochester, Marshall Ind.	716-235-7620
NY	Smithtown, Vantage Componets	516-543-2000
NC	Raleigh, Milgray	919-790-8094
NC	Raleigh, Marshall Ind.	919-878-9882
OH	Cleveland, Marshall Ind.	216-248-1788
OH	Cleveland, Milgray Electrns	800-321-0006, 216-447-1520
OH	Dayton, Marshall Ind.	800-627-1034, 513-898-4480
OR	Beaverton, Western Micro	503-629-2082
OR	Portland, Marshall Ind.	503-644-5050
TX	Austin, Marshall Ind.	512-837-1991
TX	Dallas, Marshall Ind.	214-233-5200
TX	Dallas, Milgray	214-248-1603
TX	Houston, Milgray Electrns	713-240-5360
TX	Houston, Marshall Ind.	713-467-1666
UT	Salt Lake City, Milgray Electrns	801-261-2999
UT	Salt Lake City, Marshall Ind.	801-973-2288
WA	Redmond, Western Micro	206-881-6737
WA	Seattle, Marshall Ind.	206-486-5747
WI	Milwaukee, Marshall Ind.	414-797-8400
Can	B.C. Vancouver, Marshall	800-456-6640
Can	Ontario, Ottawa, Milgray	800-268-3315
Can	Ontario, Ottawa, Marshall	800-456-6640
Can	Ontario, Toronto, Milgray	416-678-0958
Can	Ontario, Toronto, Marshall	416-458-8046
Can	Quebec, Montreal, Marshall	514-694-8142
Can	Quebec, Montreal, Milgray	514-426-5900

SOPHIA SYSTEMS AND TECHNOLOGY, 777
California Ave., Palo Alto, California 94304, Tel:
415-493-6700, FAX: 415-493-4648

SPACE RESEARCH TECHNOLOGY, INC.,
31255 Cedar Valley Drive, Suite 308, Westlake Village,
California 91362, Tel: 818-991-0693, FAX: 818-991-7021

SPANCOM CORPORATION, 528 Weddell Drive,
Suite 11, Sunnyvale, California 94089, Tel:
408-745-1788, FAX: 408-745-0435

STAC ELECTRONICS, 5993 Avenida Encinas,
Carlsbad, California 92008, Tel: 619-431-7474, FAX:
619-431-5726

Sales Office & Representatives

AL	Huntsville, M-Squared, Inc	205-830-0498
AZ	Phoenix, Oasis Sls, Inc	602-277-2714
CA	Mt. View, Brooks Tech Grp	415-960-3880
CA	San Diego, SC Cubed	619-458-5808
CA	Thousand Oaks, SC Cubed	805-496-7307
CA	Tustin, SC Cubed	714-731-9206
CO	Boulder, Thorson Rocky Mountain	303-541-9921
CO	Englewood, Thomson Rocky Mountain	303-773-6300
FL	Ft. Lauderdale, QXI, Inc	305-978-2321
FL	Melbourne, QXI, Inc	407-676-1491
FL	Orlando, QXI, Inc	407-872-2321
FL	St. Petersburg, QXI, Inc	813-894-4556
GA	Norcross, M-Squared, Inc	404-447-6124
IL	Hoffman Estates, micro-TEX	708-765-3000
MA	Woburn, Mill-Bern Assoc	617-932-3311
MI	Farmington Hills, Action Comps Sls	313-442-9880
MN	Edina, Gibb Technlg Sls	612-835-3370
MO	Chesterfield, Gibb Technlg Sls	314-530-0595
MO	Kansas City, Gibb Technlg Sls	816-483-6785

NJ	Moorestown, TAI Corp	609-778-5353
NY	E. Syracuse, Advanced Comps Corp	315-437-6700
NY	Melville, Parallax	516-351-1000
NC	Raleigh, M-Squared, Inc	919-851-0010
OH	Dayton, The Lyons Corp	513-278-0714
OH	Richfield, The Lyons Corp	216-659-9224
OH	Westerville, The Lyons Corp	614-895-1447
OK	Tulsa, West Assocs	918-492-4300
OR	Portland, ES Chase	503-292-8840
TX	Austin, West Assocs	512-343-1199
TX	Houston, West Assocs	713-999-0101
TX	Richardson, West Assocs	214-680-2800
UT	Salt Lake City, Thorson Rocky Mountain	801-942-1683
WA	Kirkland, ES Chase	206-823-9535
WI	Waukesha, micro-TEX	414-542-5352
Can	B.C., Vancouver, Electro Source	604-275-2734
Can	Ont., Kanata, Electro Source	613-592-3214
Can	Ont., Rexdale, Electro Source	416-675-4490
Can	Que., Pointe Claire, Electro Source	514-630-7486
Intl	Belgium, Inelco	32-2-224-2951
Intl	Germany, Metronik	49-89-611080
Intl	Hong Kong, Kwai Fong, NT, Memec (Asia Pacific) Ltd	852-418-0909
Intl	Italy, Acsis	39-2-439-0832
Intl	Japan, Kanagawa, CTC Comps Sys Co Ltd	044-852-5121
Intl	Korea, Seoul, Memec (Asia Pacific) Ltd	02-563-5277
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TX	Richardson, West Assocs	214-680-2800
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Intl	Germany, Dortmund, Metronik	49-231-217041
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MN	Roseville, Vector Comps	612-631-1334
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CO	Denver, IEC	303-292-6121
CT	Milford, Milgray Elctrns	203-878-5538, 800-922-6911
FL	Altamonte Springs, Zeus Comps	407-788-9100, 800-829-9464
FL	Ft. Lauderdale, All American	305-572-7999
FL	Ft. Lauderdale, Nu Horizons	305-735-2555
FL	Miami, All American	305-621-8282
GA	Atlanta, Milgray Elctrns	404-446-9777, 800-241-5523
GA	Atlanta, Nu Horizons	404-416-8666
IL	Chicago, IEC	708-843-2040
IL	Chicago, Milgray Elctrns	708-202-1900, 800-322-6271
IN	Indianapolis, Custom Services Elctrns	317-879-9119
KS	Kansas City, Milgray Elctrns	913-236-8800, 800-255-6576
MD	Columbia, Milgray Elctrns	800-638-6656, 410-995-6169
MD	Columbia, Nu Horizons	410-995-6330
MD	Columbia, Zeus Comps	301-997-1118
MA	Beverly, Sertech	617-924-9820
MA	Wakefield, All American	617-248-2300, 800-874-2834
MA	Wakefield, Nu Horizons	617-246-4442
MA	Wakefield, Zeus Comps	617-246-8200
MA	Wilmington, Milgray Elctrns	508-657-5900, 800-648-3595
MN	Minneapolis, All American	612-944-2151, 800-342-7364
NJ	Marlton, Milgray Elctrns	609-963-5010
NJ	Mt. Laurel, Nu Horizons	609-231-0900
NJ	Parsippany, Milgray Elctrns	201-335-1766, 800-622-0291
NJ	Pine Brook, Nu Horizons	201-882-8300
NJ	W. Berlin, GCI Corp	609-768-6767
NM	Albuquerque, Electrn Devices	505-822-1300
NY	Amityville, Nu Horizons	516-226-6000
NY	Farmingdale, Milgray Elctrns	800-Milgray, 516-420-9800
NY	Pittsford, Milgray Elctrns	716-381-9700
NY	Port Chester, Zeus Comps	914-937-7400
NY	Rochester, Nu Horizons	716-292-0777
NY	Ronkonkoma, All American	516-981-3935, 800-874-2830
NC	Raleigh, Milgray Elctrns	919-790-8094, 800-562-3118
OH	Cincinnati, Schuster Elctrns	513-489-1400
OH	Cleveland, Milgray Elctrns	216-447-1520, 800-321-0006
OH	Dayton, Zeus Comps	513-293-6162
OH	Twinsburg, Schuster Elctrns	216-425-8134
OR	Portland, IEC	503-641-1690
TX	Dallas, Milgray Elctrns	800-637-7227, 214-248-1603
TX	Dallas, All American	214-231-5300, 800-541-1435
TX	Dallas, Zeus Comps	214-783-7010
TX	Houston, Milgray Elctrns	713-240-5360, 800-962-1849
UT	Salt Lake City, IEC	801-977-9750
UT	Salt Lake City, Milgray Elctrns	801-261-2999, 800-537-9739
WA	Bellevue, IEC	206-455-2727
Can	Ont., Toronto, Milgray Elctrns	416-678-0958
Can	Que., Montreal, Milgray Elctrns	514-426-5900
Intl	Argentina, Colgil Inc	54-1-40-2293
Intl	Australia, Victoria, Arlec Holdings Pty Ltd	3-727-8777
Intl	Austria, Vienna, Steiner Elctrns Vertrieb GmbH	222-877-7474-0
Intl	Belgium, Wemmel, Rodelco N.V. Elctrns	2-460-0560
Intl	Brazil, Sao Paulo, Colgil Inc	55-11-66-3285
Intl	Denmark, Kokkedal, C-88 A.S.	42-244-888
Intl	Finland, Jarvenpaa, Dalma Elctrns OY	358-0-2711-800
Intl	France, Micro Puissance	1-69-07-12-11
Intl	Germany, Hamburg, Infratech Vertrieb GmbH	40-817578
Intl	Germany, Hannover, Topas Elctrn GmbH	511-131217
Intl	Germany, Kirchheim, Scantec GmbH	7021-83094
Intl	Germany, Osnabruck, Milgray Elektronik Vertiebes GmbH	541-13908-0
Intl	Germany, Planegg, Scantec GmbH	89-859-8021
Intl	Germany, Quickborn, Topas Elctrn GmbH	4106-73097
Intl	Hong Kong, Kowloon, A & N Enterprises	852-796-3788
Intl	Hong Kong, Kowloon, Leadertronics	852-3890-384
Intl	Israel, Nes Ziona, Codai Ltd	972-8-404263
Intl	Italy, Milano, Siverstar-Celdis	2-661-251
Intl	Italy, Milano, Kevin S.R.L.	2-48706300
Intl	Itlay, Milano, Dott Ing Giuseppe de Mico S.P.A.	2-95343600
Intl	Japan, Tokyo, Microtek, Inc.	3-3371-4071
Intl	Japan, Tokyo, Sys Mktg	3-3254-2751
Intl	Korea, Seoul, Leadertronics Korea Co.	2-705-1267
Intl	Korea, Seoul, Jingusa Ltd	82-02-244-7492
Intl	Netherlands, Breda, Rodelco BV	76-784-911
Intl	Norway, Oslo, Nortelco A/S	2-674020
Intl	Portugal, Lisbon, Compa Electrnos LDA	351-1-3621283
Intl	Singapore, Seamax Eng.	65-445-1828
Intl	Singapore, QuadRep Mktg. (S) PTE. LTD.	65-346-1933
Intl	So. Africa, Johannesburg, Communica	12-333-7975
Intl	So. Africa, Pretoria, Communica	12-322-7613
Intl	Spain, Madrid, Armitron S.A.	34-1-542-0906
Intl	Sweden, Bromma, Integrerad Elektronik	8-804-685
Intl	Switzerland, Zurich, Egli Fischer & Co.	1-209-8111
Intl	Taiwan, Don Business Corp	2-760-7801
Intl	Thailand, Bangkok, Seamax	662-3917020
Intl	U.K., Reading, Berks, Kudos Elctrns Ltd	734-35-1010

SYMPHONY LABORATORIES, 2620 Augustine Drive, Suite 250, Santa Clara, California 95054, Tel: 408-986-1701

SYNERGY
SEMICONDUCTOR

FAX: 408-737-0831

SYNERGY SEMICONDUCTOR CORPORATION, 3450 Central Expressway, Santa Clara, California 95051, Tel: 408-730-1313, FAX: 408-737-0831

Sales Office & Representatives

AL	Huntsville, BITS, Inc	205-881-2900
AZ	Tempe, ALTEK Comps	602-345-4575
AZ	Tucson, ALTEK Comps	602-529-0443
AR	Hot Springs Village, Southern States Mktg, Inc.	501-922-0807
CA	Irvine, Spectrum Rep Co.	714-453-1525
CA	San Diego, Excel Assoc	619-587-0545
CA	Santa Clara, Synergy Semi (Corp. Hdqts)	408-730-1313
CA	Sunnyvale, Nexus Mfgs' Rep	408-720-4787
CA	Westlake Village, Spectrum Rep Co.	818-706-2919
CO	Wheat Ridge, Waugaman Assoc. Inc	303-423-1020
CT	Wallingford, Technology Sales, Inc.	203-269-8853
FL	Boca Raton, ElectroCraft Inc	407-394-9686
FL	Largo, ElectroCraft Inc	813-544-1766
FL	Longwood, ElectroCraft Inc	407-682-7832
GA	Norcross, BITS, Inc	404-564-5599
IL	Elgin, Electrn Comps. Intl	708-888-0099
MD	Anapolis, Elctrns & Technology Sls.	301-858-8530, 410-974-9351
MA	Sudbury, Synergy Semi	508-443-1440
MA	Waltham, Technolgoy Sales, Inc.	617-890-5700
MN	Minneapolis, HMR Inc.	612-888-2122
NJ	Mt. Laurel, Wyck Mktg., Inc	609-727-1070
NY	Fairport, Technology Sales, Inc.	716-223-7500
NY	Hicksville, J-Square Mktg	516-935-3200
NC	Raleigh, BITS, Inc	919-676-1880
OR	Portland, General Electrns, Inc.	503-297-8500
TX	Austin, Southern States Mktg	512-835-5822
TX	Houston, Southern States Mktg	713-868-5180
TX	Richardson, Southern States Mktg	214-238-7500
UT	Salt Lake City, Waugaman Assoc	801-261-0802
WA	Stanwood, General Electrns, Inc.	206-246-8096
Can	Ont., Brampton, Clark-Hurman Assoc.	416-840-6066
Can	Ont., Nepean, Clark-Hurman Assoc	613-727-5626
Can	Que., Pointe Claire, Clark-Hurman Assoc.	514-426-0453
Intl	Germany, Munich, U.S.E. GmbH	011-49-89-33-92-92
Intl	Japan, Tokyo, H.Y.Assoc. Co.Ltd	011-81-03-39297111
Intl	Japan, Tokyo, Musashino, AMSC Co. Ltd.	011-81-0422-54-6801
Intl	Japan, Yokohama City, Macnica	011-81-045-939-6160

Distributors

AL	Huntsville, Nu Horizons Electrns Corp	205-722-9330
AZ	Tempe, Insight Electrns, Inc.	800-677-7716, 602-829-1800
CA	Irvine, Insight Electrns, Inc.	800-677-7716, 714-727-3291
CA	San Diego, Insight Electrns, Inc.	619-587-1100
CA	Sunnyvale, Insight Electrns, Inc.	800-677-7716, 408-720-9222
CA	Westlake Village, Insight Elctrns, Inc	800-677-7716, 818-707-2101
CO	Highlands Ranch, Insight Elctrns, Inc	800-677-7716, 303-791-7516
FL	Ft. Lauderdale, Nu Horizons Electrns Corp.	305-735-2555
GA	Norcross, Nu Horizons Electrns Corp.	404-416-8666
IL	Schaumburg, Insight Electrns, Inc.	800-667-7716, 708-885-9700
MD	Columbia, Nu Horizons Electrns Corp	410-995-6330
MA	Wakefield, Nu Horizons Electrns Corp	617-246-4442
NJ	Mt. Laurel, Nu Horizons Electrns Corp.	609-231-0900
NJ	Pine Brook, Nu Horizons Electrns	201-882-8300
NY	Amityville, Nu Horizons Electrns Corp.	516-226-6000
NY	Rochester, Nu Horizons Electrns Corp.	716-292-0777
OR	Beaverton, Insight Electrns, Inc.	800-677-7716, 503-644-3300
TX	Austin, Insight Electrns, Inc.	800-677-7716, 512-250-0885
TX	Richardson, Insight Electrns, Inc.	800-677-7716, 214-783-0800
TX	Sugar Land, Insight Electrns, Inc.	800-677-7716, 713-879-0577
WA	Kirkland, Insight Electrns, Inc	800-677-7716, 206-820-8100

SYSTRONIX. INC., 754 East Roosevelt Avenue, Salt Lake City, Utah 84152-6398, Tel: 801-487-7412, TELEX: 6503091533, FAX: 801-487-3130

TECHNITROL, INC., 1952 East Allegheny Avenue, Philadelphia, Pennsylvania 19134, Tel: 215-426-9105, FAX: 215-426-2836

TEKTRONIX, INC., P.O. Box 500, M/S 59-420, Beaverton, Oregon 97077, Tel: 503-627-2515, TELEX: 910-467-8708, FAX: 503-627-5660

Sales Office & Representatives

CA	Newport Beach, Leading Concept Tech. Inc	714-851-0654

CA	Santa Clara, Quorum Tech Sales	408-980-0812
CA	Woodland Hills, Los Angeles Field Office	818-999-1711
FL	Longwood, Delmac Sls., Inc	407-831-0040
IL	Elk Grove Vlg, Oasis Sales Corp	708-640-1850
IA	Cedar Rapids, Oasis Sales Corp	319-377-8738
MD	Gaithersburg, Tektronix, National Sales	301-590-7580
MA	Burlington, Dynamic Sales of New England, Inc	617-272-5676
MN	Bloomington, Oasis Sales corp	612-941-1917
NY	Melville, Parallax	516-351-1000
NC	Apex, Eastern Region	919-662-2213
OR	Beaverton, Northwest Region	503-627-1039
TX	Richardson, OM Assoc.	214-690-6746
WI	Brookfield, Oasis Sales Corp	414-782-6660

TELEDYNE COMPONENTS, 1300 Terra Bella Avenue, P.O. Box 7267, Mountain View, California 94039-7267, Tel: 415-968-9241, TWX: 910-379-6494, FAX: 415-967-1590

Sales Office & Representatives

AZ	Tempe, Elctrn Tech Sls	602-921-7122
CA	Heidsburg, ProLine Tech	916-442-8681
CA	Mountain View, Teledyne Comps	415-968-9241
CA	San Diego, Bestronics, Inc.	619-693-1111
CA	San Jose, Pro Merge Sls, Inc	408-748-2970
CA	Santa Ana, Unitech Sls Inc	714-556-8661
CO	Denver, AKI Enterprises	303-756-0700
IL	Algonquin, Teq Sls	708-854-4501
IA	Cedar Rapids, Rep Assocs Corp	319-373-0152
MD	Towson, Arbotek Assocs	410-825-0775
MA	North Reading, Alpha-Omega Sales	508-664-1118
MA	Wellsley, Teledyne Comps	617-237-9696
MI	Farmington Hills, Luebbe Sls Co	313-489-8828
MN	Eden Prairie, Comprehensive Tech Sls	612-941-7181
MO	Raytown, CenTech Inc	816-358-8100
NJ	Fairfield, Metro Logic	201-575-5585
NJ	Mount Laurel, S-J Mid-Atlantic	609-866-1234
OH	Cincinnati, Luebbe Sls Co	513-530-0600
OH	Dayton, Luebbe Sls Co	513-438-0490
OH	Westlake, Luebbe Sls Co	216-899-0071
OR	Beaverton, Comps West	503-642-9110
PA	Pittsburgh, Luebbe Sls Co	412-364-0490
TX	Austin, Bravo Sls	512-328-7550
TX	Houston, Bravo Sls	713-230-0500
TX	Richardson, Bravo Sls	214-238-7500
UT	Salt Lake City, AKI Enterprises	303-756-0700
WA	Redmond, Comps West	206-885-5980
WI	Wauwatosa, Larsen Assoc	414-258-0529
Can	B. C., Vancouver, Weiss Co	604-873-1112
Can	Manitoba, Winnepeg, Weiss Co	204-772-3665
Can	Ont., Mississauga, Weiss Co	416-673-0011
Can	Ont., Nepean, Weiss Co	613-692-0617
Can	Que., Dorval, Weiss Co	514-685-6644
Intl	England, Middlesex, Teledyne Comps	44-1-571-9596
Intl	West Germany, Wiesbaden, Teledyne Comps	49-611-76360

Distributors

AL	Huntsville, Future Elctrns	205-830-2322
AL	Huntsville, Marshall Inds	205-881-9235
AZ	Phoenix, Future Elctrns	602-968-7140
AZ	Phoenix, Marshall Inds	602-496-0290
CA	Burbank, Elmo Semiconductor Corp	818-768-7400
CA	Calabasas, Marshall Inds	818-878-7000
CA	Chatsworth, Future Elctrns	818-772-6240
CA	El Monte, Marshall Inds	1-800-522-0084
CA	Irvine, Marshall Inds	714-458-5301
CA	Irvine, Future Elctrns	714-250-4141
CA	Milpitas, Marshall Inds	408-942-4600
CA	Rancho Cordova, Marshall Inds	916-635-9700
CA	San Diego, All American	619-458-5850
CA	San Diego, Marshall Inds	619-627-4140
CA	San Diego, Future Elctrns	619-625-2800
CA	San Jose, Future Elctrns	408-434-1122
CA	San Jose, All American	408-943-1200
CA	Torrance, All American	310-320-0240
CO	Lakewood, Future Elctrns	303-232-2008
CO	Thornton, Marshall Inds	303-451-8383
CT	Bethel, Future Elctrns	203-743-9594
CT	Wallingford, Marshall Inds	203-265-3822
FL	Altamonte Springs, Marshall Inds	407-767-8585
FL	Altamonte Springs, Future Elctrns	407-767-8414
FL	Ft. Lauderdale, Marshall Inds	305-977-4880
FL	Largo, Future Elctrns	813-530-1222
FL	Miami, All American	305-621-8282
FL	Orlando, Chip Supply	407-298-7100
FL	St. Petersburg, Marshall Inds	813-573-1399
FL	Sunrise, All American	305-572-7999
GA	Norcross, Future Elctrns	404-441-7676
GA	Norcross, Marshall Inds	404-923-5750
IL	Rosemont, Advent Elctrns	708-298-4210
IL	Schaumburg, Future Elctrns	708-882-1255
IL	Schaumburg, Marshall Inds	708-490-0155
IN	Indianapolis, Marshall Inds	317-297-0483
IN	Indianapolis, Advent Elctrns	317-872-4910
IA	Cedar Rapids, Advent Elctrns	319-363-0221
KS	Lenexa, Marshall Inds	913-492-3121
MD	Columbia, Future Elctrns	301-290-0600
MD	Rockville, All American	301-251-1205
MD	Silver Springs, Marshall Inds	301-622-1118
MA	Bolton, Future Elctrns	508-779-3000
MA	Wakefield, All American	617-246-2300
MA	Wilmington, Marshall Inds	508-658-0810
MA	Wilmington, North Star Elctrns	508-657-5155
MI	Farmington Hills, Advent Elctrns	313-477-1650
MI	Livonia, Future Elctrns	313-261-5270
MI	Livonia, Marshall Inds	313-525-5850
MN	Eden Prairie, All American	612-944-2151
MN	Eden Prairie, Future Elctrns	612-944-2200
MN	Plymouth, Marshall Inds	612-559-2211
MN	Thief River Falls, Digi-Key	218-681-6674
MO	Bridgeton, Marshall Inds	314-291-4650
MO	St. Louis, Future Elctrns	314-469-6805
NJ	Fairfield, Marshall Inds	201-882-0320
NJ	Marlton, Future Elctrns	609-596-4080
NJ	Mt. Laurel, Marshall Inds	609-234-9100
NJ	Parsippany, Future Elctrns	201-299-0400
NY	Endicott, Marshall Inds	607-785-2345
NY	Hauppauge, Future Elctrns	516-234-4000
NY	Hauppauge, Marshall Inds	516-273-2424
NY	Rochester, Future Elctrns	716-272-1120
NY	Rochester, Marshall Inds	716-235-7620
NY	Ronkonkoma, All American	516-981-3935
NY	Syracuse, Future Elctrns	315-451-2371
NC	Concord, Future Elctrns	704-455-9030
NC	Raleigh, Future Elctrns	919-790-7111
OH	Dayton, Marshall Inds	513-898-4480
OH	Mayfield, Future Elctrns	216-449-6996
OH	Solon, Marshall Inds	216-248-1788
OR	Beaverton, Marshall Inds	503-644-5050
OR	Beaverton, Future Elctrns	503-645-9454
TX	Austin, Marshall Inds	512-837-1991
TX	Houston, Marshall Inds	713-467-1666
TX	Houston, Future Elctrns	713-556-8696
TX	Richardson, All American	214-231-5300
TX	Richardson, Marshall Inds	214-705-0600
TX	Richardson, Future Elctrns	214-437-2437
UT	Salt Lake City, Future Elctrns	801-972-8489
UT	Salt Lake City, Marshall Inds	801-973-2288
UT	Salt Lake City, All American	801-261-4210
WA	Bothel, Marshall Inds	206-486-5747
WA	Bothell, Future Elctrns	206-489-3400
WI	Waukesha, Future Elctrns	414-786-1884
WI	Waukesha, Marshall Inds	414-797-8400
WI	West Allis, Advent Elctrns	414-475-6860
Can	Alb., Calgary, Future Elctrns	403-250-5550
Can	Alb., Edmonton, Future Elctrns	403-438-2858
Can	B. C., Vancouver, Future Elctrns	604-294-1166
Can	Manitoba, Winnipeg, Future Elctrns	204-786-7711
Can	Ont., Brampton, Marshall Inds	416-458-8046
Can	Ont., Mississauga, Future Elctrns	416-612-9200
Can	Ont., Ottawa, Future Elctrns	613-820-8313
Can	Que., Pointe Claire, Marshall Inds	514-694-8142
Can	Que., Pointe Claire, Future Elctrns	514-694-7710
Can	Que., Quebec City, Future Elctrns	418-877-6666
Intl	Argentina, Buenos Aires, Tinko SA	45-6563
Intl	Australia, Victoria, R & D Elctrns	3-558-0444
Intl	Denmark, Copenhagen, Prescom A/S	45-42-189800
Intl	Finland, Helsinki, ITT Multicomponets	011-468-83-0020
Intl	Finland, Helsinki, ITT Multicomponents	011-03586926022
Intl	France, ITT Multicomponents	1-64-46-0200
Intl	France, Sevres, Tekelec Airtronic SA	011-146-232-425
Intl	Germany, Future Elctrns	49-89-957-1950
Intl	Germany, Weisbauer Elektronik GmbH	011-49231579547
Intl	Germany, Semitron W. Rock GmbH	011-49-774280010
Intl	Germany, CED Ditronic GmbH	011-49-711-720010
Intl	Germany, Hamburg, Adelco Elektronik GmbH	011-49-41062024
Intl	Hong Kong, Dynatek	011-852-796-6689
Intl	Italy, Vicenza, Velco SRL	011-39-444-922922
Intl	Japan, Osaka, Tomen Electrns Corp.	011-81-6208-3636
Intl	Japan, Tokyo, Tomen Electrns Corp.	01181-3-506-3477
Intl	Japan, Tokyo, Shinjuku-Ku, Hi-Rel Co Ltd	01181-3-2608401
Intl	Korea, Seoul, Vine-Overseas Trading Corp.	011-82-2-266-1663
Intl	Malaysia, Kuala Lumpur, NIE Elctrns	011-603-6212122
Intl	Netherlands, ITT Multicomponents	46-8-830020
Intl	Norway, Oslo, ITT Multicomponents	468-83-00-20
Intl	Orlando,FL (Mexican Distrib.), Chip Supply	305-298-7100
Intl	Portugal, Compa	011-351-1362-1283/84
Intl	Russia, Moscow, PC Techno	709-546-18775
Intl	Singapore, NIE Elctrns	011-4833133
Intl	Spain, Madrid, Amitron S.A.	01134-542-0906
Intl	Sweden, ITT Multicomponents	011-468-83-00-20
Intl	Switzerland, Oberlunkhofen, ENA AG	011-4157342834
Intl	Taiwan, Taipei, Timkuo Taiwan Ltd.	011-886-2-752-5577
Intl	Turkey, Istanbul, Empa	011-90-599-3050
Intl	U. K., Castlehill, Phoenix Elctrns	01144-0555-751566
Intl	U. K., Surrey, Redhill, Trident Microsystems Ltd.	011-44-737765-900
Intl	U.K., Berks, Future Elctrns Ltd	011-44-753-687-000

TELTONE CORPORATION, 22121-20th Avenue. SE, Bothel, Washington 98021-4408, Tel: 206-487-1515, 1-800-426-3926, FAX: 206-487-2288

Sales Office & Representatives

AL	Huntsville, A.C.M. Corp.	205-881-5493
CA	Irvine, Vale Elctrns	714-551-4004
CA	Mountain View, G.N.A., Inc.	415-961-6740
FL	Longwood, Beacon Elctrns	407-332-1940
FL	West Palm Bch, Beacon Elctrns	407-996-4741
GA	Norcross, A.C.M. Corp.	404-448-7025
IL	The Dombrow Co	708-253-3326
MA	Wayland, Daner-Hayes	800-225-8760, 508-655-0888
NY	Vestal, DH Tech	607-729-3906
TX	Dallas/Ft.Worth, Miles J. Cooley Co.	214-262-5893
WA	Bothell, Teltone Corp	1-800-426-3926, 206-487-1515
WI	The Dombrow Co	414-263-4116
Intl	New Zealand, Auckland, Philips Comps	64-9-849-4160

Distributors

AL	Bell Inds	205-837-1074
AL	Huntsville, Comp Distributors	800-888-0331, 205-851-7800
AZ	Phoenix, Bell Inds	602-966-7800
CA	Agoura Hills, Bell Inds	818-879-9494
CA	Cypress, Bell Inds	714-895-7801
CA	Sacramento, Bell Inds	916-652-0418
CA	Sacramento, G.N.A. Inc	209-223-3389
CA	San Diego, Bell Inds	619-268-1277
CA	Sunnyvale, Bell Inds	408-734-8570
CA	Tustin, High Tech. Semi.	714-259-7733
CO	Denver, Bell Inds	303-691-9010
CO	Denver, Comp Distributors	303-770-6214, 1-800-557-7357
CT	Hartford, Bell Inds	203-269-6000
CT	Wellingford, Cronin Elctrns	203-265-3134
FL	Clearwater, Comp Distributors	813-796-0466
FL	Ft. Lauderdale, Bell Inds	305-421-1997
FL	Orlando, Bell Inds	407-339-0078
FL	Palm Bay, Comp Distributors	800-558-2351, 407-724-9910
FL	Tampa, Bell Inds	813-541-4434

GA	Atlanta, Bell Inds	404-446-7167
GA	Norcross, Comp Distributors	404-441-3320, 1-800-874-7209
IL	Bensenville, AVG Elctrns	800-323-6639, 708-860-7171
IL	Chicago, Bell Inds	708-640-1910
IL	Urbana, Bell Inds	217-328-1077
IN	Ft. Wayne, Bell Inds	219-422-4300
IA	Bell Inds	319-395-0730
KY	Bell Inds	1-800-582-7492, 1-800-445-8795
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MN	Bell Inds	612-941-1493
MO	Bell Inds	314-647-2355
NH	Cronin Elctrns	603-624-0105
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NM	Albuquerque, Bell Inds	505-292-2700
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NC	Raleigh, Comp Distributors	919-847-8288
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Can	Que., Montreal, Kaytronics Inc.	514-745-5800
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NJ	Anthem	201-227-7960
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NC	Marshall	919-878-9882
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OH	Dayton, Marshall	513-898-4480
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TX	Houston, Hall-Mark	713-781-6100
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UT	Salt Lake City, Wyle	801-974-9953
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Intl	Taiwan, Kaohsiung, Taiwan TOKO Elctrns Co., Ltd	07-361-2011-18
Intl	Taiwan, Taipei, Huacheng TOKO Elctrns Co., Ltd	02-768-4131-4
Intl	U.K., England, TOKO (U.K.) Ltd	0753-854057-9

Distributors

CA	San Jose, Passive Technlg	408-435-5566
CA	Sunnyvale, Penstock	408-730-0300

MA	Wilmington, North Star Elctrns	508-657-5155
MN	So. Thief River Falls, Digi-Key Corp	800-344-4539

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PA (609) 231-0900
OH (216) 349-2008
FL (305) 735-2555
No.FL (407) 831-8008
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TOSHIBA AMERICA ELECTRONIC COMPONENTS, INC., 9775 Toledo Way, Irvine, California 92718, Tel: 714-455-2000, FAX: 714-859-3963

Sales Office & Representatives

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CA	Fountain Valley, Bager Elctrns	714-957-3367
CA	Irvine, Toshiba America Elctrn Comps	714-453-0224
CA	Irvine, Toshiba America Elctrn Comps	714-455-2000
CA	Los Altos, Elrepco Inc.	415-962-0660
CA	Sunnyvale, Toshiba America Elctrn Comps	408-737-9844
CA	Woodland Hills, Bager Elctrns	818-712-0011
CA	Woodland Hills, Toshiba America Elctrn Comps	818-596-2170
CO	Englewood, Toshiba America Elctrn Comps	303-220-9848
CO	Westminister, Straube Assoc. Mountain States, Inc.	303-426-0890
FL	Altamonte Springs, Toshiba America Elctrn Comps	407-332-0966
FL	Altamonte Springs, Sales Engnr Concepts	407-830-8444
FL	Boca Raton, Toshiba America Elctrn Comps	407-998-9204
FL	Deerfield Bch, Sales Engnr Concepts	305-426-4601
GA	Norcross, Toshiba America Elctrn Comps	404-368-0203
GA	Norcross, M-Squared, Inc	404-447-6124
IL	Deerfield, Toshiba America Elctrn Comps	708-945-1500
IL	Elk Grove Village, Carlson Elctrn Sales	708-956-8240
IN	Indianapolis, Precision Elctrn Comps.	317-842-3740
IA	Cedar Rapids, Carlson Elctrn Sls	319-378-1450
KS	Wichita, D.L.E. Electrns	316-683-6400
MD	Lutherville, D.G.R. Inc.	410-583-1360
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MA	Wakefield, Toshiba America Elctrn Comps	617-224-0074
MI	Farmington Hills, Action Comp Sls., Inc	313-442-9880
MI	Southfield, Toshiba America Elctrn Comps	313-827-7700
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MO	St. Louis, Tech Sls Assocs	314-521-2044
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NC	Raleigh, Toshiba America Elctrn Comps	919-859-2800
NC	Raleigh, M-Squared, Inc	919-836-1350, 919-851-0010
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OH	Columbus, J. R. Thornberry	614-478-1882
OR	Beaverton, Toshiba America Elctrn Comps	503-629-0818
OR	Beaverton, Comps West	503-642-9110
PA	Bridgeville, J. R. Thornberry	412-745-8441
PA	Horsham, Nexus Technology	215-675-9600
TX	Austin, MIL-REP Assocs., Inc.	512-346-6331
TX	Austin, Toshiba America Elctrn Comps	512-335-2270
TX	Houston, MIL-REP Assocs., Inc.	713-444-2557
TX	Richardson, MIL-REP Assocs., Inc.	214-644-6731
TX	Richardson, Toshiba America Elctrn Comps	214-480-0470
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WA	Redmond, Comps West	206-885-5880
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Can	Ontario, Kanata, Electro Source	613-592-3214
Can	Ontario, Rexdale, Electro Source	416-675-4490
Can	Quebec, Pointe Claire, Electro Source	514-630-7486

Distributors

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AL	Huntsville, Reptron Elctrns	205-722-9500
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AZ	Phoenix, Marshall Inds	602-496-0290
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CA	Agoura Hills, Western Microtechnology	818-707-0731
CA	Calabasas, Marshall Inds	818-878-7000
CA	El Monte, Marshall Inds	818-307-6000
CA	Irvine, Marshall Inds	714-458-5301
CA	Irvine, Insight Elctrns	714-727-3291
CA	Milpitas, Marshall Inds.	408-942-4600
CA	Orange, Western Microtechnology	714-637-0200
CA	Rancho Cordova, Marshall Inds.	916-635-9700
CA	San Diego, Western Microtechnology	619-453-8430
CA	San Diego, Sterling Elctrns	619-560-8097
CA	San Diego, Insight Elctrns	619-587-1100
CA	San Diego, Marshall Inds.	619-627-4140
CA	San Jose, Merit Electrns, Inc.	408-434-0800
CA	San Jose, Sterling Elctrns	408-435-5566
CA	Saratoga, Western Microtechnology	408-725-1660
CA	Sunnyvale, Insight Elctrns	800-677-7716, 408-720-9222
CA	Tustin, Sterling Elctrns	714-259-0900
CA	Westlake, Sterling Elctrns	88-865-2333
CA	Westlake Village, Insight Elctrns	800-677-7716
CO	Englewood, Sterling Elctrns	303-792-3939
CO	Englewood, Insight Elctrns	303-649-1800, 800-677-7716
CO	Thornton, Marshall Inds.	303-451-8383
CT	Wallingford, Sterling Elctrns	203-265-9535
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FL	Altamonte Springs, Marshall Inds.	407-767-8585
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FL	Ft. Lauderdale, Reptron Elctrns	305-735-1112
FL	Ft. Lauderdale, Marshall Inds.	305-977-4880
FL	Ft. Lauderdale, Nu Horizons Elctrns	305-735-2555
FL	St. Petersburg, Marshall Inds.	813-573-1399
FL	Tampa, Reptron Elctrns	813-855-4656
GA	Norcross, Reptron Elctrns	404-446-1300
GA	Norcross, Marshall Inds.	404-923-5750
GA	Norcross, Nu Horizons Elctrns	404-416-8666
IL	Schaumburg, Reptron Elctrns	708-882-1700
IL	Schaumburg, Sterling Elctrns	708-303-9900
IL	Schaumburg, Marshall Inds.	708-490-0155
IN	Indianapolis, Marshall Inds.	317-297-0483
KS	Lenexa, Marshall Inds	913-492-3121
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MD	Columbia, Sterling Elctrns	410-290-3800
MD	Columbia, Nu Horizons Elctrns	410-995-6330
MD	Silver Spring, Marshall Inds.	301-622-1118
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MA	Wakefield, Nu Horizons Elctrns	617-246-4442
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MI	Livonia, Reptron Elctrns	313-525-2700
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MO	Bridgeton, Marshall Inds.	314-291-4650
NJ	Edison, Sterling Elctrns	908-417-1000
NJ	Fairfield, Marshall Inds	201-882-0320
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NJ	Mt. Laurel, Marshall Inds.	609-234-9100
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NY	Rochester, Nu Horizons Elctrns	716-292-0777
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TX	Austin, Marshall Inds.	512-837-1991
TX	Austin, Insight Elctrns	512-331-5887
TX	Carrollton, Sterling Elctrns	214-243-1600
TX	Houston, Sterling Elctrns	713-627-9800
TX	Houston, Marshall Inds.	713-467-1666
TX	Richardson, Insight Elctrns	214-783-0800
TX	Richardson, Marshall Inds	214-705-0600
TX	Sugarland, Insight Elctrns	713-448-0800
UT	Salt Lake City, Sterling Elctrns	801-972-5444
UT	Salt Lake City, Marshall Inds	801-973-2288
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IL	DTS & Assocs	708-595-9210
IN	Electrn Mktg Consultants	317-921-3450
KS	Impaq Sales	913-764-1727
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OR	Electrn Solutions	503-292-8204
PA	Deltatronics, Inc	215-641-9930
TX	Impaq Sales	214-650-0000
TX	Impaq Sales	713-820-0288
TX	Impaq Sales	512-335-9666
WA	E2	206-637-0302
WI	DTS & Assocs	414-784-3544
Can	BBD Elctrns	416-821-7800
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AL	Huntsville, JHA	205-461-8591
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AZ	Scottsdale, TDSI	602-998-2444
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CA	Mountain View, RF Assocs. North, Inc	415-694-4972
CA	San Diego, Centaur Corp	619-278-4950
CA	Santa Clara, Quorum Tech Sls	408-980-0812
CA	Santa Clara, TriQuint Semi	408-982-0900
CO	Littleton, Lange Sls	303-795-3600
CO	Littleton, Lange Sls., Inc	303-795-3600
CT	Hamden, Datcom, Inc	203-288-7005
FL	Ft. Lauderdale, Dyne-A-Mark Corp	305-771-6501
FL	Ft. Lauderdale, Dyne-A-Mark Corp	305-771-6501
FL	Maitland, Dyne-A-Mark Corp	407-660-1661
FL	Maitland, Dyne-A-Mark Corp	407-660-1661
GA	Alpharetta, JHA	404-475-2654
GA	Tucker, Rep, Inc	404-938-4358
ID	Boise, Lange Sls	208-323-0713
ID	Boise, Lange Sls	208-323-0713
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IL	Elk Grove Village, Oasis Sls	708-640-1850
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IN	Batesville, Applied Data Management	317-257-8949
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IA	Cedar Rapids, Oasis Sls	319-377-8738
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MD	Laurel, Electrn Mktg. Assoc	301-953-7800
MA	Waltham, Datcom, Inc	617-891-4600
MA	Westford, Electrns Microtech Assocs	508-692-0070
MI	Ann Arbor, Applied Data Mgt	313-741-8558
MI	Ann Arbor, Applied Data Management	313-741-8558
MN	Bloomingon, Oasis Sls	612-941-1917
MN	Bloomington, Oasis Sls	612-941-1917
MO	Florissant, Central Tech Sls	314-831-4069
MO	Florissant, Central Tech Sls	314-831-4069
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NM	Albuquerque, Nelco Electronix	505-293-1399
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NY	E. Rochester, Tri-Tech Elctrns	716-385-6500
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NY	Fayetteville, Tri-Tech Elctrns	315-446-2881
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NY	Fishkill, Tri-Tech Elctrns	914-897-5611
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NC	Raleigh, New Era Sls, Inc	919-878-0400
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OH	Cincinnati, Applied Data Mgt	513-579-8108
OR	Portland, Thorson Company NW	503-293-9001
PA	Yardley, TriQuint Semi	215-493-6944
TN	Jefferson City, Rep, Inc	615-475-9012
TN	Knoxville, JHA	615-694-7541
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TX	Arlington, ION Assocs, Inc	817-695-8000
TX	Austin, ION Assocs, Inc	512-794-9006
TX	Austin, ION Assocs, Inc	512-794-9006
TX	Houston, ION Assocs, Inc.	713-537-7717
TX	Houston, ION Assocs, Inc	713-537-7717
TX	Plano, TriQuint Semi	217-422-2532
UT	Salt Lake City, Lange Sls, Inc	801-487-0843
UT	Salt Lake City, Lange Sls, Inc	801-487-0843
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Can	Ont., Kanata, Electro Source, Inc	613-592-3214
Can	Ont., Rexdale, Electro Source, Inc	416-675-4490
Can	Ont., Rexdale, Electro Source, Inc	416-675-4490
Can	Que., Pointe Claire, Electro Source, Inc	514-630-7486
Can	Que., Pointe Claire, Electro Source, Inc	514-630-7486
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Intl	Germany, Solingen, DACOM West GmbH	49-212-593-011/012
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Distributors

AL	Huntsville, Nu Horizons Elctrns	205-722-9330
AL	Huntsville, Comp Distributors, Inc	205-851-8700
AZ	Tempe, Insight Elctrns	602-829-1800, 800-677-7716
CA	Irvine, Insight Elctrns	714-727-3291, 800-677-7716
CA	San Diego, Insight Elctrns	619-587-1100
CA	San Jose, Merit Elctrns, Inc	408-434-0800
CA	Sunnyvale, Insight Elctrns	408-720-9222
CA	Westlake Village, Insight Elctrns	818-707-2101
CO	Denver, Comp Distributors, Inc	303-770-6214
CO	Englewood, Insight Elctrns	303-649-1800
CT	Monroe, Nu Horizons Elctrns	203-265-0162
FL	Altamonte Springs, Nu Horizons Elctrns	407-831-8008
FL	Clearwater, Comp Distributors, Inc	813-796-0046
FL	Ft. Lauderdale, Nu Horizons Elctrns	305-735-2555
FL	Palm Bay, Comp Distributors, Inc	407-724-9910
GA	Norcross, Nu Horizons Elctrns	404-416-8666
GA	Norcross, Comp Distributors, Inc	404-441-3320
MD	Columbia, Nu Horizons Elctrns	410-995-6330
MA	Wakefield, Nu Horizons Elctrns	617-246-4442
NJ	Mt. Laurel, Nu Horizons Elctrns	609-231-0900
NJ	Pine Brook, Nu Horizons Elctrns	201-882-8300
NY	Amityville, Nu Horizons Elctrns	516-226-6000
NY	Rochester, Nu Horizons Elctrns	716-292-0777
OH	Solon, Nu Horizons Elctrns	216-349-2008
OR	Beaverton, Insight Elctrns	503-644-3300
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TX	Richardson, Insight Elctrns	214-783-0800
TX	Sugarland, Insight Elctrns	713-448-0800
WA	Kirkland, Insight Elctrns	206-820-8100

TRW LSI PRODUCTS INC., P.O. Box 2472, La Jolla, California 92038, Tel: 619-457-1000, TELEX: 697-957, TWX: 910-355-1571, FAX: 619-455-6314

Sales Office & Representatives

Intl	Japan, TRW (Asian Sales Off.)	44-844-5673
Intl	U.K.,England, TRW (European Sales Off.)	483-300018

TSENG LABS, INC., 10 Pheasant Run, Newtown, Pennsylvania 18940, Tel: 215-968-0502

UNICORN MICROELECTRONICS CORP., 3350 Scott Blvd. Building 49, Santa Clara, California 95054, Tel: 408-727-9239, TELEX: 172730 NMC SNTA, FAX: 408-492-1720

Sales Office & Representatives

AL	Huntsville, ACM, Inc.	205-881-5493
AZ	Tempe, E.T.S.A., Inc.	602-921-7122
CA	Fountain Valley, Dynarep (O.C)	714-545-3255
CA	Laguna Hills, Advanced Concepts	714-583-2525
CA	Mountain View, GNH	415-961-6740
CA	San Diego, Prosales	619-571-1133
CA	Simi Valley, Dynarep (LA)	805-527-0072
CA	Valley Springs, GNH	209-772-2696
CO	Aurora, Moss Mktg.	303-340-8535
CT	Middlebury, Rosen Assocs.	617-449-4700

FL	Altamonte Springs, C. Assocs.	407-831-1717
FL	Boca Raton, C. Assocs.	407-488-6090
FL	Palm Harbor, C. Assocs.	813-736-3422
GA	Norcross, ACM, Inc.	404-448-7025
IL	Berkeley, ESA Tech Mktg. Inc.	708-544-0120
MD	Gaithersburg, Eltron Sales	301-921-0302
MA	Needham Hghts., Rosen Assocs.	617-449-4700
MI	Oak Park, A. Blumenberg Assoc., Inc.	313-968-3230
MN	Oakdale, Complete Sales	612-731-2923
NJ	Fairfield, Astrorep Inc.	201-808-0025
NY	Babylon, Astrorep, Inc.	516-422-2500
NC	Charlotte, Prime Comps	704-522-1150
NC	Raleigh, Prime Comps	919-850-9866
OH	Mentor, Sales Plus	216-942-7811
OK	Dublin, Sales Plus	614-889-8362
OR	Portland, Electrn Engnr Sales	503-639-3978
PA	Broomall, L.D. Lowery, Inc.	215-356-5300
UT	Salt Lake City, Wasatch Reps.	801-265-0286
VA	Front Royal, Eltron Sales	703-635-7201
VA	Roanoke, Eltron Sales	703-366-7248
VA	Virginia Beach, Eltron Sales	804-425-7891
WA	Redmond, Electrn Engnr Sales	206-883-3374
Can	Ontario, Markham, Componetics	416-479-7200
Can	Ottawa, Compton, Componetics	613-728-1050
Can	Quebec, St. Laurent, Componetics	514-331-9930
Intl	Argentina, Buenos Aires, Elko Comps Electrnos	40-3607/5281/8971
Intl	Austria, Spittal/Drau, Leitgeb KG	222-715-3251
Intl	Belguim, Bruxelles, Inelco Electrns	32-2-216-0160
Intl	Brazil, Sao Paulo, Matriz	011-581-7842
Intl	Denmark, Albertslund, AEG-Dansk Aktieselskab	45-42-64-8522
Intl	England, Berkshire, Manhattan Skyline Ltd.	44-628-75851
Intl	England, Oxfordshire, Metl	44-844-278781
Intl	England, Sutton Surrey, Product Assessment	44-1-661-6281
Intl	Finland, Espoo, Yleiselektronikka Oy	358-0-452-1255
Intl	France, Paris, Asia Mos	33-1-4760-1255
Intl	Hong Kong, Kowloon, United Microelec Co., Ltd.	852-765-7122
Intl	Hong Kong, Kowloon, Comp Supplies Ltd.	852-365-7171
Intl	Hong Kong, Kowloon, S.A.S. Electrn Co., Ltd.	852-362-0271-6
Intl	India, New Delhi, Permedia Assocs.	91-11-733839
Intl	Ireland, Dublin, Neltronic Ltd.	353-1-501845
Intl	Israel, Herzlia, Unitec Universal Technology Ltd.	52-57-6006
Intl	Israel, Herzlia, Unitec Universal Technology Ltd.	52-57-6006
Intl	Italy, Milan, Esco Italiana S.P.A.	39-2-240-9241
Intl	Japan, Kawasaki-City, Japan Macnics Corp.	81-44-7110022
Intl	Japan, Tokyo, UMC K.K.	03-280-3661
Intl	Japan, Tokyo, Rectronics Corp.	81-3-878-2901
Intl	Japan, Tokyo, Nissei Electrns, Ltd.	03-504-7922
Intl	Korea, Seoul, Dongjin Trading Co., Ltd.	82-2-4912211-5
Intl	Korea, Seoul, Kortronics Enterprise	82-2-562-9055-7
Intl	Netherlands, United Microelec (Europe) B.V.	020-970-766
Intl	Netherlands, Stadskanaal, Elincom Elektronische Compen	05990-14830
Intl	Norway, Oslo, Topcomp Elektronikk	47-2-7722860
Intl	Portugal, Lisbon, Niposom-J. Nabais, LDA.	01-894637
Intl	S. Africa, Promilect (Pty) Ltd.	27-11-887-2110
Intl	Singapore, Sintronic Co.	65-294-3815
Intl	Spain, Barcelona, Venco Electrna S.A.	34-3-330-9751
Intl	Sweden, Stockholm, Topcomp Elektronik	46-8-752-9265
Intl	Switzerland, Zurich, ICCM Electrns AG	41-1-432-3434
Intl	Taiwan, Kaohsiung, Commonworth Enterprise Co., Ltd.	07-282-8806
Intl	Taiwan, Kaohsiung, Jiuntair Enterprise Co., Ltd.	07-281-4204
Intl	Taiwan, Taipei, Bright Up Inds. Co., Ltd.	773-2194
Intl	Taiwan, Taipei, Golden Device Elctrns. Co., Ltd.	776-5066
Intl	Taiwan, Taipei, Unitech Device Corp.	776-0560-5
Intl	Turkey, Istanbul, Barkey Co., Ltd.	90-1-131-1289
Intl	W. Germany, Discomp Elektronik GmbH	49-711-704061
Intl	W. Germany, Monheim, Schukat Electrn Vertriebs GmbH	49-2173-39660
Intl	W. Germany, Nagold, Endrich Bauelemente Vertriebs GmbH	49-7452-2868
Intl	W. Germany, Taunusstein-Hahn, Manhattan Skyline GmbH	49-6128-23044

Distributors

AL	Huntsville, Reptron Elctrns.	205-722-9500
AZ	Phoenix, Future Elctrns.	602-968-7140
AZ	Scottsdale, AVED	602-951-9788
AZ	Tempe, Cypress Elctrns.	602-966-2256
CA	Agoura Hills, Almo Electrns	818-991-3984
CA	Aguora Hills, Western Microtechnology	818-707-0377
CA	Anaheim, Almo Electrns	714-777-4711
CA	Buena Park, Cypress Elctrns.	714-521-5230
CA	Chatsworth, Cetec Future	818-700-0914
CA	Fountain Valley, Bell Microproducts, Inc.	714-963-0667
CA	Irvine, Cetec Future	714-250-4141
CA	Milpitas, Bell Microproducts, Inc.	408-434-1150
CA	Orange, Western Microtechnology	714-637-0200
CA	San Diego, AVED Inc.	619-558-8890
CA	San Diego, Cypress/RPS Electrns	619-535-0011
CA	San Diego, Cetec Future	619-278-5020
CA	San Diego, Western Microtechnology	619-453-8430
CA	San Jose, Almo Elctrns.	408-436-8822
CA	San Jose, Future Electrns, Inc.	408-434-1122
CA	Santa Clara, Cypress Elctrns.	408-980-2500
CA	Santa Clara, Bradas Microtech	408-988-8900
CA	Santee, Mouser Electrns	619-449-2300
CA	Saratoga, Western Microtechnology	408-725-1660
CA	Tustin, AVED Inc.	714-259-8258
CA	Visalia, AVED Inc.	209-734-8861
CA	Westlake Village, AVED, Inc.	818-889-2861
CO	Arvada, Beta Wintronic	303-431-7161
CO	Englewood, Cypress Elctrns.	303-792-5829
CO	Wheat Ridge, AVED Rocky Mtn., Inc.	303-422-1701
CT	Bethel, Future Electrns, Inc.	203-743-9594
CT	Monroe, Western Microtechnology	203-452-0533
FL	Altamonte Springs, Future Elctrns., Inc.	407-767-8414
FL	Clearwater, Future Elctrns., Inc.	813-578-2770
FL	Deerfield Beach, Vantage Comps	407-429-1001
FL	Ft. Lauderdale, Reptron Elctrns., Inc.	800-365-4321
FL	Longwood, Interec Comps.	407-834-7777
FL	Miami, Etek Electrns Corp.	305-593-1188
FL	Tampa, Reptron Electrns, Inc.	813-854-2351
FL	Tampa, Reptron Electrns, Inc.	813-855-4656
GA	Norcross, Future Elctrns., Inc.	404-441-7676
GA	Norcross, Reptron Electrns	404-446-1300
IL	Bensenville, GBL Goold	312-860-7171
IL	Schaumburg, Future Elctrns., Inc.	312-882-1255
IL	Schaumburg, QPS Elctrns., Inc.	312-884-6620
IL	Schaumburg, Reptron Elctrns.	312-882-1700
MD	Columbia, Future Elctrns., Inc.	301-995-1222
MD	Columbia, General Radio Supply Co.	301-995-6744
MD	Columbia, Vantage Comps	301-720-5100
MA	Andover, AVED Electrns, Inc.	508-688-3800
MA	Burlington, Western Microtechnology	617-273-2800
MA	Canton, Almo Electrns	617-821-1450
MA	Westborough, Future Electrns, Inc.	508-366-2400
MA	Wilmington, Bell Microproducts	508-658-0222
MI	Farmington Hills, LSI Mktg	313-553-7800
MI	Grand Rapids, Calder Electrns	616-698-7400
MI	Livonia, Reptron Elctrns.	313-525-2700
MN	Eden Prairie, Future Elctrns., Inc.	612-944-2200
MN	Minnetonka, Reptron Electrns	612-938-0000
NJ	Camden, General Radio Supply Co.	609-964-8560
NJ	Clifton, Vantage Comps Inc.	201-777-4100
NJ	Fairfield, Future Electrns, Inc.	201-227-4346
NJ	Fairfield, Western Microtechnology	201-882-4999
NJ	Marlton, Western Microtechnology	609-596-7775
NJ	Mt. Laurel, Future Electrns, Inc.	609-778-7600
NJ	Pennsauken, Alta	609-488-1442
NJ	Randolph, Mouser Electrns	201-328-3322
NY	Liverpool, Future Electrns, Inc.	315-451-2371
NY	Rochester, Future Electrns, Inc.	716-272-1120
NY	Smithtown, Vantage Comps, Inc.	516-543-2000
NC	Raleigh, Reptron Electrns	919-870-5189
OH	Dayton, Televox	800-333-8353
OH	Solon, Reptron Electrns	216-349-1415
OH	Worthington, Reptron Electrns	614-436-6675
OR	Beaverton, Cypress Electrns	503-641-2233
OR	Beaverton, Future Electrns, Inc.	503-645-9454
OR	Beaverton, Western Microtechnology	503-629-2082
PA	N. Versailles, CMD Electrns	412-678-6020
TX	Austin, AVED, Southwest, Inc.	512-454-8845
TX	Austin, Omni Pro	512-794-9200
TX	Carrollton, Reptron/Dallas	214-702-9373
TX	Dallas, AVED, Southwest, Inc.	214-404-1144
TX	Dallas, Bradas Electrns	214-869-9500
TX	Dallas, Omni Pro	214-233-9368
TX	Dallas, TMMI	214-669-0331
TX	Dallas, Western Microelec	214-248-3775
TX	Houston, Western Microelec	713-954-4850
TX	Mansfield, Mouser Electrns	817-483-0165
TX	Richardson, Future Electrns, Inc.	214-437-2437
UT	Salt Lake City, Future Electrns, Inc.	801-972-8489
UT	West Valley City, AVED-Rocky Mtn., Inc.	801-975-9500
UT	West Valley City, Beta-Wintronic	801-966-0236
WA	Bothell, Bradas	206-281-8900
WA	Redmond, Future Electrns, Inc.	206-881-8199
WA	Redmond, Western Microtechnology	206-881-6737
Can	Ontario, Downsview, Future Electronique Inc.	416-638-4771
Can	Ontario, Toronto, Zanin Electronique, Inc.	416-674-7220
Can	Quebec, Pt. Claire, Future Electronique Inc.	514-694-7710
Can	Quebec, St. Laurent, Zanin Electronique, Inc.	514-342-6211

UNISYS CORPORATION, 640 North 2200 West,
Salt Lake City, Utah 84116, Tel: 801-594-2001, FAX:
801-594-5908 or 594-4127

UNITED
TECHNOLOGIES
MICROELECTRONICS
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UNITED TECHNOLOGIES MICROELECTRONICS CENTER, 1575
Garden of the Gods Road, Colorado Springs, Colorado
80907, Tel: 719-594-8000, 800-MIL-UTMC

Sales Office & Representatives

AL	Huntsville, The Novus Grp	205-534-0044
AZ	Tempe, Quatra Assocs, Inc	602-820-7050
CA	Aliso Viejo, UTMC Sls Off	714-362-2260
CA	Camarillo, UTMC Sls Off	805-445-6665
CA	Irvine, Technlg Solutions	714-707-4565
CA	Milpitas, Marcon Sls, Inc	408-263-3660
CA	San Diego, Quest-Rep, Inc	619-622-5040
CA	Westlake Village, Spectrum Rep Co	818-706-2919
CA	Woodland Hills, UTMC Sls Off	818-992-5399
CO	Colorado Springs, UTMC Sls Off	719-594-8166
CO	Denver, Alliance Elctrns Colorado	303-433-1648
FL	Altamonte Springs, Semtronic Assocs, Inc	407-831-8233
FL	Melbourne, UTMC Sls Off	407-951-4164
IL	Inverness, Heartland Tech Mktg	708-358-6622
IN	Carmel, STB & Assocs, Inc	317-844-9227
MD	Annapolis, ETSI	410-974-9351
MD	Columbia, UTMC Sls Off	410-312-5734
MA	Braintree, UTMC Sls Off	617-356-5600
MA	Waltham, 3D Sls, Inc	617-890-2221
MI	Farmington Hills, Action Comps. Sls, Inc	313-442-9880
MN	Edina, Mel Foster Tech Sls	612-941-9790
MO	Bridgeton, AEM, Inc	314-298-9900
NY	Manlius, Quality Comps	315-682-8885
NY	Melville, Tech Mktg Grp	516-351-8833
OH	Dayton, The Lyons Corp	513-278-0714

PA	Hatboro, Delta Tech Sls, Inc	215-957-0600
TX	Irving, Comp Tech Sls, Inc	214-751-1181
UT	Bountiful, Anderson Assocs	801-292-8991
WA	Bellevue, Westmark Elctrns, Inc	206-455-3460
Can	Ont., Rexdale, Electro Source	416-675-4490

UNITRODE INTEGRATED CIRCUITS CORP., 7 Continental Blvd., Merrimack, New Hampshire 03054-0399, Tel: 603-424-2410, TELEX: 95-3040, FAX: 603-424-3460

Sales Office & Representatives

AL	Huntsville, R.O. Whitesell	205-883-5110
AZ	Tucson, Compass Mktg	602-577-5146
CA	Calabasas, Centaur Corp.	818-591-1655
CA	Irvine, Unitrode Integrated Circuits Corp	714-261-1546
CA	Irvine, Centaur Corp	714-261-2123
CA	San Diego, Centaur Corp.	619-278-0649
CA	Santa Clara, I2 Inc.	408-988-3400
CO	Englewood, Comp Sales	303-779-8060
FL	Boca Raton, R.O. Whitesell	407-393-6139
FL	Longwood, R.O. Whitesell	407-682-6662
FL	Palm Harbor, R.O. Whitesell	813-787-0898
GA	Hoffman Estates, Victory Sales	708-490-0300
GA	Norcross, R.O. Whitesell	404-449-9190
IN	Fort Wayne, Scott Electrns	219-489-5690
IN	Indianapolis, Scott Electrns	317-841-0010
KS	Olathe, Advanced Tech Sales	913-782-8702
MD	Columbia, Third Wave Solutions	301-290-5990
MA	Lexington, Kanan Assoc	617-861-7300
MI	Grosse Pnte Prk, Greiner Assoc	313-499-0188
MN	Eden Prairie, Aldridge Assoc	612-944-8433
MO	Bridgeton, Advanced Tech Sales	314-291-5003
NM	Albuquerque, Compass Mktg	505-344-9990
NY	Commack, ERA Inc.	516-543-0510
NY	Endwell, Reagan Compar	607-754-2171
NC	Greensboro, R.O. Whitesell	919-273-1945
NC	Wake Forest, R.O. Whitesell	919-556-8448
OH	Cincinnati, R.O. Whitesell	513-521-2290
OH	Cleveland, R.O. Whitesell	216-447-9020
OH	Columbus, R.O. Whitesell	614-888-9396
OH	Dayton, R.O. Whiteell	513-298-9546
OK	Tulsa, Nova Mktg	918-660-5105
OR	Portland, Northwest Mktg	503-620-0441
PA	Pittsburg, R.O. Whitesell	412-963-0620
TX	Austin, Nova Mktg	512-343-2321
TX	Dallas, Nova Mktg	214-750-6082
TX	Houston, Nova Mktg	713-988-6082
TX	Irving, Unitrode Integrated Circuits Corp	214-650-1934
UT	Medrale, CSI	801-561-5688
WA	Bellevue, Nortwest Mktg	206-455-5846
WI	Brookfield, Victory Sales	414-789-5770
Can	British Coumbia, Burnaby, Kaytronics	604-294-2000
Can	Ontario, Kanata, Kaytronics Ltd.	613-564-0080
Can	Ontario, Toronto, Kaytronics	416-669-2262
Can	Quebec, Ville St. Laurent, Kaytronics	514-745-5800
PR	Rio Peidro, Electrn Sales Assoc.	809-762-6459

Distributors

AL	Huntsville, Hall Mark	205-837-8700
AL	Huntsville, Hamilton	205-837-7201
AZ	Phoenix, Hall Mark	602-437-1200
AZ	Tempe, Hamilton	602-961-6400
CA	Chatsworth, Hall Mark	818-773-4568
CA	Citrus Heights, Hall Mark	916-722-8600
CA	Costa Mesa, Hamilton	714-641-4169
CA	Culver City, Hamilton	213-558-2000
CA	Irvine, Hall Mark	714-727-6000
CA	Irvine, Falcon	714-757-1955
CA	Ontario, Hamilton	714-641-4100
CA	Sacramento, Hall Mark	916-624-9781
CA	Sacramento, Hamilton	916-925-2216
CA	San Diego, Hamilton	619-571-7510
CA	San Diego, Hall Mark	619-268-1201
CA	San Jose, Hall Mark	408-432-4000
CA	San Jose, Zeus	408-629-4789
CA	Sunnyvale, Hamilton	408-743-3328
CA	Tustin, Hall Mark	714-669-4100
CA	Wooodland Hills, Hamilton	213-516-8600
CA	Yorba Linda, Zeus	714-921-9000
CO	Engelwood, Hamilton	303-799-0633
CO	Englewood, Hall Mark	303-790-1662
CT	Cheshire, Hall Mark	203-271-2844
CT	Danbury, Hamilton	203-797-2800
CT	Milford, Falcon	203-878-5272
FL	Ft. Lauderdale, Hall Mark	305-971-9280
FL	Ft. Lauderdale, Hamilton	305-979-2802
FL	Ft. Lauderdale, Nu Horizons	305-735-2555
FL	Largo, Hall Mark	813-541-7440
FL	Orlando, Hall Mark	407-830-5855
FL	Oviedo, Zeus	305-365-3000
FL	St. Petersburg, Hamilton	813-573-3930
FL	Winter Park, Hamilton	407-628-3888
FL	Winter Park, Falcon	407-671-3739
GA	Norcross, Hall Mark	404-623-4400
GA	Norcross, Hamilton	404-447-7507
IL	Bensenville, Hamilton	708-860-7780
IL	Wooddale, Hall Mark	708-860-3800
IN	Carmel, Hamilton	317-844-9333
IN	Indianapolis, Hall Mark	317-872-8875
IA	Cedar Rapids, Hamilton	319-362-4757
KS	Lenexa, Hall Mark	913-888-4747
KS	Overland Park, Hamilton	913-888-8900
MD	Baltimore, Falcon	301-247-5800
MD	Columbia, Hallmark	301-988-9800
MD	Columbia, Hamilton	301-995-3500
MD	Columbia, Nu Horizons	301-995-6330
MD	Columbia, Zeus	301-997-1118
MA	Billerica, Hall Mark	617-935-9777
MA	Franklin, Falcon	508-520-0323
MA	Lexington, Zeus	617-246-8200
MA	Peabody, Hamilton	508-532-9840
MA	Wakefield, Nu Horizons	617-246-4442
MI	Grand Rapids, Hamilton	616-243-8805
MN	Eden Prairie, Hall Mark	612-941-2600
MN	Minnitonka, Hamilton	612-932-0600
MO	Earth City, Hall Mark	314-291-5350
MO	Earth City, Hamilton	314-537-1600
NJ	Cherry Hill, Hamilton	609-424-0100
NJ	Fairfield, Hall Mark	201-515-3000
NJ	Fairfield, Hamilton	201-575-3390
NJ	Fairfield, Nu Horizons	201-882-8300
NJ	Morristown, Hall Mark	609-235-1900
NY	Amityville, Nu Horizons	516-226-6000
NY	Hauppauge, Hamilton	516-231-9800
NY	Hauppauge, Falcon	516-724-0980
NY	Port Chester, Zeus	716-937-7400
NY	Rochester, Hamilton	716-475-9130
NY	Rochester, Nu Horizons	716-248-5980
NY	Ronkonkoma, Hall Mark	516-737-0600
NC	Raleigh, Hall Mark	919-872-0712
NC	Raleigh, Hamilton	919-878-0810
OH	Centerville, Hamilton	513-439-6700
OH	Solon, Hall Mark	216-349-4632
OH	Worthington, Hall Mark	614-888-3313
TX	Austin, Hall Mark	512-258-8848
TX	Austin, Hamilton	512-837-8911
TX	Houston, Hall Mark	713-781-6100
TX	Richardson, Zeus	214-783-7010
WA	Bellevue, Hamilton	206-881-6697
WA	Lynwood, Falcon	206-774-3005
WI	New Berlin, Hall Mark	414-797-7844
WI	New Berlin, Hamilton	414-784-4510
Can	Alberta, Calgary, Hamilton	403-250-9380
Can	British Columbia, Burnaby, Hamilton	604-420-4101
Can	British Columbia, Vancouver, Future	604-294-1166
Can	Ontario, Downsview, Future	416-638-4771
Can	Ontario, Mississauga, Hamilton	416-677-7432
Can	Ontario, Nepean, Hamilton	613-226-1700
Can	Ontario, Ottawa, Future	613-820-8313
Can	Quebec, Montreal, Hamilton	514-335-1000
Can	Quebec, Pointe Claire, Future	514-694-7710

UNIVERSAL SEMICONDUCTOR INC., 1925 Zanker Road, San Jose, California 95112, Tel: 408-436-1906, TWX: 910-338-7617, FAX: 408-436-1125

Sales Office & Representatives

CA	Torrance, Orion Eclipse	213-326-0999
OH	Cincinnati, Giesting & Assocs.	513-385-1105
TX	Dallas, Innovative Tech Sales	214-699-3485
Intl	Japan, Tokyo, Internix, Inc.	01-81-3-3367-3227

USAR SYSTEMS, INC., 568 Broadway, Suite 405, New York, New York 10012, Tel: 212-226-2042, FAX: 212-226-3215

Sales Office & Representatives

MA	Westford, Electrn Microtech Assocs	508-692-0070
NY	New York, USAR Sys INc	212-226-2836
Intl	France, Rueil Malmaison, Rep' France	1-47-08-30-90
Intl	Germany, Sauerlach, First Comps GmbH	49-8104-1068
Intl	Taiwan, Taipei R.O.C., QuadRep Electrns (T) Ltd	02-3955665

VADEM, 1885 Lundy Ave., San Jose, California 95131, Tel: 408-943-9301, TELEX: 887-591 (VADEM SNTA UD), FAX: 408-943-9735

Sales Office & Representatives

CA	San Jose, Exis Inc	408-456-1650
FL	Orlando, Currie, Peak & Frazier, Inc	407-855-0843
GA	Norcross, Twentieth Century Mktg, Inc	404-446-1999
IL	Schaumburg, Martan, Inc	708-303-5745
IN	Carmel, Technology Mktg Corp	317-459-5152
MA	Woburn, Compass Technlg	617-933-3336
MI	Novi, Miltimore Sls	
NJ	Fairfield, Metro Logic Corp	201-575-5585
NY	Pittsford, Elcom Sls Inc	716-385-1400
OH	Cincinnati, TMC of Ohio	513-271-3860
WA	Bellevue, Venture Elctrns, Inc	206-454-4594
Can	Que., Ville St-Laurent, Kaytronics,Inc	514-745-5800

VANGUARD SEMICONDUCTOR, Div of California Micro Devices, 211 Topaz Street, Milpitas, California 95035, Tel: 408-946-9111, 800-325-4966, FAX: 408-263-7846

VERTEX SEMICONDUCTOR CORP., 1060 Rincon Circle, San Jose, California 95131, Tel: 408-456-8900, FAX: 408-456-8910

VITELIC, See Mosel-Vitelic

VITESSE SEMICONDUCTOR CORP., 741 Calle Plano, Camarillo, California 93012, Tel: 805-388-7501, FAX: 805-388-7565

Sales Office & Representatives

AZ	Phoenix, Reptronix, Ltd	602-230-2630
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CA	Newport Bch, Leading Concept Technlgs	714-851-0654
CA	San Diego, Bestronics of San Diego, Inc	619-693-1111
CA	Sunnyvale, Vitesse Semicond. Corp	408-730-3645
CO	Englewood, Thorson Rocky Mtn., Inc	303-799-3435
FL	Vero Bch, Vitesse Semicond. Corp	407-234-5411
IL	Rolling Meadows, Phase II Mktg., Inc	708-806-1330
IN	Indianapolis, C.C. Electro Sls. Inc	317-921-5000
MD	Columbia, Avtek Assocs	301-740-5100
MA	Wellesley, Vitesse Semicond. Corp	617-239-8075
NJ	Chester, Vitesse Semicond. Corp	908-879-8066
NM	Albuquerque, Reptronix, Ltd	505-292-1718
OH	Dayton, Lyons Corp	513-278-0714
OR	Beaverton, Advanced Tech Mktg., Inc	503-643-8307
TX	Dallas, Vitesse Semicond. Corp	214-888-6081
UT	Salt Lake City, Thorson Rocky Mtn., Inc	801-942-1683
WA	Redmond, Advanced Tech Mktg., Inc	206-869-7636
WI	Wauwatosa, Phase II Mktg., Inc	414-771-9986
Intl	France, Orsay Cedex, Thomson Composants Microondes	33-1-60-19-7000
Intl	Israel, Herzlia, AST	972-52-583355
Intl	Japan, Tokyo, H.Y. Assocs. Co., Ltd	81-33-929-7111

Intl	Korea, (Calabasas, CA), Beaver Intl Inc	818-591-0356
Intl	Taiwan, Taipei ROC, Tamarack Microelec	886-2-772-7400

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CA	Cameron Park, Emerging Technology	916-676-4387
CA	Encino, VLSI Technology, Inc.	818-609-9981
CA	Irvine, VLSI Technology, Inc.	714-250-4900
CA	San Jose, Emerging Technology	408-263-9366
CA	San Jose, VLSI Technology, Inc.	408-922-5200
CO	Longmont, SIS Microelec Inc. (Des. Ctr)	303-776-1667
CO	Longmont, Luscombe Eng. of Co.	303-772-3342
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FL	Pompano Beach, VLSI Technology,Inc.	305-971-0404
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IL	Naperville, ASIC Designs (Des. Ctr)	708-717-5841
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MN	St. Louis Park, VLSI Technology, Inc.	612-545-1490
MO	St. Louis, Electri-Rep	314-993-4421
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NY	E. Rochester, VLSI Technology, Inc.	716-586-0670
NY	Fishkill, VLSI Technlg Inc	914-897-8574
NY	Syracuse, Advanced Comps	315-437-6700
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OH	Cleveland, VLSI Technology, Inc.	216-292-8235
OR	Beaverton, Electra Tech. Sls.	503-643-5074
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PA	Valley Forge, Integrated Circuit (Des Ctr)	215-666-1900
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TX	Richardson, VLSI Technology, Inc.	214-231-6716
UT	Salt Lake City, Luscombe Engnr	801-565-9885
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WA	Kirkland, Electra Tech. Sales.	206-821-7442
Can	Alberta, Davetek Mktg Inc	403-250-2034
Can	British Columbia, Davetek Mktg Inc	604-430-3680
Can	Ont., Mississauga, Intelatech Inc	416-629-0082
Intl	Australia, Adelaide, George Brown Group	61-8-352-2222
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CT	Wallingford, Arrow/Schweber Elctrns	203-265-7741
FL	Deerfield Bch, Arrow/Schweber Elctrns	305-429-8200
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VTC INC., 2800 Old Shakopee Road, Bloomington, Minnesota 55425, Tel: 612-851-5200

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FL	Orlando, CM Mktg	407 841-9924
FL	Tamarac, CM Mktg	305-722-9369
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IL	Barrington, Omni Electrn Mktg	312 381-9087
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NH	Nashua, VTC Inc.	603 882-4110
NJ	Teaneck, Tech Mktg Group	201 692-0200
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OH	Cincinnati, G&H Sales	513-272-0580
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TX	Houston, Southern States Mktg	713 960-9556

TX	Lewisville, VTC Inc.	214 436-0779
TX	Richardson, Southern States Mktg, Inc.	214-238-7500
UT	Salt Lake, Quorum 3 Sales Group	801 943-9227
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Can	Mississauga, Ontario, Electrn Sales Professionals	416-626-8221
Can	Ontario, Ottawa, Elect. Sales Professionals	613 236-1221
Can	Quebec, Chateauguay, Elect. Sales Professionals	514 848-7064
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NC	Charlotte, Pioneer	704-527-8188
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CA	Santa Clara, I Squared, Inc	408-988-3400
CA	Woodland Hills, Bager Elctrns Inc.	818-712-0011
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IL	Hoffman Estates, Midwest Rgn Sls	708-882-1893
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PA	Trevose, Northeast Rgn Sls	215-638-9617
TN	Jefferson City, Rep. Inc	615-475-9012
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TX	Dallas, Bravo Sls, Inc	214-250-2900
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NY	Hauppauge, Arrow/Schweber	516-231-1000
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NY	Melville, Arrow/Schweber (H.Q.)	516-391-1300
NY	Rochester, Arrow/Schweber	716-427-0300
NY	Rochester, Time Elctrns	716-383-8853
NY	Smithtown, Vantage Comps	516-543-2000
NC	Charlotte, Time Elctrns	800-833-8235
NC	Raleigh, Arrow/Schweber	919-876-3132
ND	Time Elctrns	800-331-5114
OH	Centerville, Arrow/Schweber	513-435-5563
OH	Columbus, Time Elctrns	614-761-1100
OH	Solon, Arrow/Schweber	216-248-3990
OK	Tulsa, Arrow/Schweber	918-252-7537
OR	Beaverton, Almac/Arrow Elctrns	503-629-8090
OR	Beaverton, Wyle Labs	503-643-7900
OR	Portland, Time Elctrns	503-684-3780
PA	Philadelphia, Time Elctrns	215-337-0900
PA	Pittsburgh, Arrow/Schweber	412-963-6807
PA	Pittsburgh, Time Elctrns	800-331-5114
SD	Time Elctrns	800-331-5114
TX	Austin, Wyle Labs	512-345-8853
TX	Austin, Arrow/Schweber	512-835-4180
TX	Austin, Time Elctrns	512-339-3051
TX	Carrollton, Arrow/Schweber	214-380-6464
TX	Houston, Wyle Labs	713-879-9953
TX	Houston, Arrow/Schweber	713-530-4700
TX	Houston, Time Elctrns	713-530-0800
TX	Richardson, Time Elctrns	214-241-7441
TX	Richardson, Wyle Labs	214-235-9953
UT	Salt Lake City, Arrow/Schweber	801-973-6913
UT	West Valley, Time Elctrns	801-973-8181
UT	West Valley, Wyle Labs	801-974-9953
WA	Bellevue, Almac/Arrow Elctrns	206-643-9992
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WA	Redmond, Wyle Labs	206-881-1150
WA	Spokane, Almac/Arrow Elctrns	509-924-9500
WI	Time Elctrns	800-331-5114
WI	Brookfield, Arrow/Schweber	414-792-0150
WI	Milwaukee, Marsh Elctrns	414-475-6000
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Can	Ont., Mississauga, Arrow/Schweber	416-670-7769
Can	Ont., Nepean, Arrow/Schweber	613-226-6903
Can	Que., Dorval, Arrow/Schweber	514-421-7411
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Intl	England, Thame, Oxon, Micro Call Ltd.	44-84-426-1939
Intl	Finland, Helsinki, Nortec Elctrns OY	358-067-02-77

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Intl	Korea, Seoul, Woo Young Tech Co Ltd	82-2-369-7099
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Intl	Portugal, Lisboa, ATD Electrna LDA	3511-847-2200
Intl	Singapore, Tech Distrib Pte Ltd	65-299-7811
Intl	So. Africa, Brooklyn, I.C. Design Centre Pty Ltd	2712-73-1122
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WDC

FAX: 602-835-6442

THE WESTERN DESIGN CENTER, INC., 2166 East Brown Road, Mesa, Arizona 85213, Tel: 602-962-4545, FAX: 602-835-6442

WESTERN DIGITAL CORPORATION, 8105 Irvine Center Drive, Irvine, California 92718, Tel: 714-932-5000, FAX: 714-932-6294

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Intl	U. K., Surrey, Western Dig. Ltd	011-44-372-360055

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CA	Sacramento, Wyle	916-638-5282
CA	San Diego, Wyle	619-565-9171
CA	Santa Clara, Wyle	408-727-2500
CO	Denver, Wyle	303-457-9953
MA	Boston, Wyle	617-272-7300
OR	Portland, Wyle	503-643-7900
TX	Austin, Wyle	512-345-8853
TX	Dallas, Wyle	214-235-9953
TX	Houston, Wyle	713-879-9953
UT	Salt Lake City, Wyle	801-974-9953
WA	Seattle, Wyle	206-881-1150
Can	Alb., Calgary, Zentronics	403-295-8838
Can	Alb., Edmonton, Zentronics	403-484-1669
Can	B.C., Vancouver, Zentronics	604-273-5575
Can	Canada, Zentronics	800-661-6241
Can	Manitoba, Saskatoon, Zentronics	306-955-2202
Can	Manitoba, Winnipeg, Zentronics	204-694-1957
Can	Ont., Ottawa, Zentronics	613-226-8840
Can	Ont., Toronto, Zentronics	416-564-8600
Can	Que., Montreal, Zentronics	514-737-9700
Can	Que., Quebec, Zentronics	418-654-1077

WHITE TECHNOLOGY, INC., 4246 E. Wood Street, Phoenix, Arizona 85040, Tel: 602-437-1520, FAX: 602-437-9120

XECOM, INC., 374 Turquoise Street, Milpitas, California 95035, Tel: 408-945-6640, FAX: 408-942-1346

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CA	Agoura, Quadrep Southern, Inc	818-597-0222
CA	Irvine, Quadrep Southern, Inc	714-727-4222
CA	San Diego, Quadrep Southern, Inc	619-755-1188
CA	Santa Clara, Quorum Tech Sales	408-980-0812
CT	Wallingford, Technology Sales, Inc.	203-269-8853
IL	Skokie, Industrial Reps. Inc.	708-967-8430
KS	Overland Park, AME Sls	913-492-3971
MD	Columbia, Robert Electrn Sales	410-995-1900
MA	Waltham, Technology Sales, Inc.	617-890-5700
MN	Bloomington, Industrial Reps. Inc	612-854-1120
MO	St. Charles, AME Sls	314-928-2599
NE	Omaha, Io Neb	402-895-4431
NY	Calverton, RGK Co	516-369-9732
NY	Fairport, Technology Sales, Inc.	716-223-7500
NC	Charlotte, Robert Electrn Sales	704-536-4690
NC	Raleigh, Robert Electrn Sales	919-878-4465
OH	Cincinnati, Arthur Baier Co	513-779-2395
OH	Cleveland, Arthur Baier Co	216-292-7500
OH	Columbus, Arthur Baier Co	614-764-1144
OH	Dayton, Arthur Baier Co	513-233-0081
OR	Portland, Q.R. Crown	503-620-8320
PA	Pittsburg, Arthur Baier Co	412-367-7799
PA	Willow Grove, Technology Sls Assocs	215-784-0770
TX	Austin, Logic 1 Sales	512-345-2952
TX	Houston, Logic 1 Sales	713-444-7594
TX	Richardson, Logic 1 Sales	214-234-0765
WA	Bellevue, Q.R. Crown	206-453-5100
WI	Pewaukee, Industrial Reps., Inc	414-574-9393
Intl	England, Bucks, XECOM Ltd	0296-770011

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Can	Que., Montreal, Intelatech, Inc	514-369-1317
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Intl	Singapore, Quadrep Mktg (S) Pte Ltd	346-1933
Intl	Switzerland, Zurich, Computer Controls A.G.	01-313-0616
Intl	Taiwan, Taipei ROC, Quadrep Elctrns (T) Ltd	02-395-5665
Intl	U.K., Basingstoke, Hampshire, Amega Elctrns	0256-843166
Intl	U.K., Basingstroke, Telecom Design Communications Ltd	0256-332800
Intl	West Germany, Hamburg, Microscan Electrns GmbH	011-494-063-200349

XICOR, INC., 1511 Buckeye Court, Milpitas, California 95035, Tel: 408-432-8888, TWX: 910-379-0033, FAX: 408-432-0640

Sales Office & Representatives

AL	Huntsville, CSR Electrns, Inc.	205-533-2444
AZ	Scottsdale, Thorn Luke Sales, Inc.	602-941-1901
CA	Auburn, Ewing-Foley, Inc.	916-885-6591
CA	Calabasas, Centaur Corp	818-704-1655
CA	Irvine, Centaur Corp	714-261-2123
CA	Los Altos, Ewing-Foley, Inc.	415-941-4525
CA	Newport Beach, Xicor Southwestern Sales Office	714-752-8700
CA	San Diego, Centaur Corp	619-278-4950
CA	Santa Clara, Xicor Northwestern Sales Office	408-292-2011
CO	Aurora, Electrodyne, Inc.	303-695-8903
CT	Danbury, Xicor Mid-Atlantic Sales Office	203-743-1701
FL	Altamonte Springs, Xicor Southeast	407-767-8010
FL	Clearwater, Delmac Sales Inc.	813-447-5192
FL	Deerfield Beach, Delmac Sales Inc.	305-427-7788
FL	Longwood, Delmac Sales Inc.	305-831-0040
GA	Atlanta, CSR Electrns Inc.	404-396-3720
IL	Elk Grove Village, Oasis Sales Corp.	312-640-1850
IL	Schaumburg, Xicor North Central Sales Office	708-605-1310
IN	Ft. Wayne, Arete Sales, Inc.	219-423-1478
IN	Greenwood, Arete Sales, Inc.	317-882-4407
IA	Cedar Rapids, Chuck Horn & Assoc	319-393-8703
KS	Goddard, Midwest Tech Sales	316-794-8565
KS	Lenexa, Midwest Tech Sales	913-888-5100
MD	Baltimore, Micro Comp. Inc.	301-644-5700
MA	Waltham, Xicor North East Sales Office	617-899-5510
MA	Westwood, Comp Rep Assoc	617-329-3454
MI	Novi, Action Comp Sales	313-349-3940
MN	Eden Prairie, The Twist Co.	612-941-2040
MO	St. Charles, Midwest Tech Sales	314-441-1012
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NY	Rochester, Electra Sales Corp.	716-427-7860
NY	Syracuse, Electra Sales Corp.	315-463-1248
NC	Charlotte, CSR Electrns Inc.	704-847-5806
NC	Raleigh, CSR Electrns Inc.	919-878-9200
OH	Dayton, Midwest Mktg Assoc	513-433-2511
OH	Dublin, Midwest Mktg Assoc	614-766-2427
OH	Lyndhurst, Midwest Mktg Assoc	216-381-8575
OK	Tulsa, Nova Mktg	918-660-5105
OR	Tigard, Vantage Corp.	503-620-3280
PA	Huntingdon Valley, Omega Electrn Sales, Inc.	215-947-4135
TN	Knoxville, CSR Electrns Inc.	615-577-1317
TX	Austin, Nova Mktg. Inc.	512-343-2321
TX	Dallas, Xicor South Central	214-669-2022
TX	Dallas, Nova Mktg., Inc.	214-750-6082
TX	Houston, Nova Mktg., Inc.	713-988-6082
UT	Salt Lake City, Electrodyne, Inc.	801-264-8050
WA	Bellevue, Vantage Corp.	206-455-3460
WI	Brookfield, Oasis Sales Corp.	414-782-6660
Can	Concord, Ontario, Kaytronics	416-669-2262
Can	Kanata, Ontario, Kaytronics, Inc.	613-592-6606
Can	Quebec, Ville St. Laurent, Kaytronics	514-745-5800
Can	Surrey, B.C., Kaytronics	604-581-5005
Intl	Asia/Pacific, Xicor,Inc (Milpitas CA)	408-432-8888
Intl	Australia, Burwood, Victoria, R & D Electrns	61.3.288.8232
Intl	Austria, Vienna, Othmar Lackner Elektronische	222.752618
Intl	Denmark, Kokkedal, C.88 A/S	452.244888
Intl	England, Thame Oxon, Micro Call Ltd.	44.84.421.5405
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Intl	France, Le Kremlin Bicetre, Xicor Sarl	33-1-46-71-49-00
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Intl	Japan, Tokyo, Internix	81.3.369.1105
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Intl	Mechelen, Belgium, Microtron	32.15.21.22.23
Intl	Netherlands, Ijssel, Alcom Electrns	31.10.451.9533
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Intl	Norway, Hvalstad, Nordisk Elektronik	472.846210
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PR	Caguas, Delmac Sales Inc	809-743-0657

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CA	Calabasas, Wyle Labs	818-880-9000
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CA	Citrus Heights, Hall-Mark	916-722-8600
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NY	Johnson City, Marshall	607-798-1611
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NC	Raleigh, Hall-Mark	919-872-0712
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OH	Dayton, Marshall	513-898-4480
OH	Dayton, Pioneer	513-236-9900
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OH	Solon, Hall-Mark	216-349-4632
OH	Worthington, Hall-Mark	614-888-3313
OR	Beaverton, Marshall	503-644-5050
OR	Hillsboro, Wyle Labs	503-640-6000
PA	Horsham, Pioneer	215-674-4000
PA	Pittsburgh, Pioneer	412-782-2300
TX	Austin, Pioneer	512-835-4000
TX	Austin, Hall-Mark	512-258-8848
TX	Austin, Marshall	512-837-1991
TX	Austin, Wyle Labs	512-834-9957
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TX	Dallas, Pioneer	214-386-7300
TX	Dallas, Hall-Mark	214-553-4300
TX	Houston, Pioneer	713-988-5555
TX	Houston, Hall-Mark	713-781-6100
TX	Houston, Marshall	713-895-9200
TX	Houston, Wyle Labs	713-879-9953
TX	Richardson, Wyle Labs	214-235-9953
UT	Salt Lake City, Hall-Mark	801-972-1008
UT	Salt Lake City, Marshall	801-485-1551
UT	West Valley City, Wyle Labs	801-974-9953
WA	Bellevue, Wyle Labs	206-453-8300
WA	Bellevue, Marshall	206-747-9100
WI	New Berlin, Hall-Mark	414-797-7844
WI	Waukesha, Marshall	414-797-8400
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Can	Calgary, Alberta, Zentronics	403-295-8836
Can	Calgary, Alberta, Saynor Varah	403-255-9550
Can	Don Mills, Ontario, Saynor Varah	416-445-0723
Can	Edmonton, Alberta, Saynor Varah, Inc.	403-441-5018
Can	Nepean, Ontario, Zentronics	613-226-8840
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Can	St. Laurent, Quebec, Zentronics	514-737-9700
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Can	Winnipeg, Manitoba, Zentronics	204-694-1957

XILINX CORP., 2100 Logic Drive, San Jose, California 95124, Tel: 408-559-7778, FAX: 408-559-7114

Sales Office & Representatives

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CA	Granite Bay, Norcomp	916-791-7776
CA	Irvine, Xilinx, Inc.	714-727-0780
CA	San Diego, Quest-Rep	619-622-5040
CA	San Jose, Xilinx, Inc.	408-559-7778
CA	Santa Clara, Norcomp	408-727-7707
CA	Santa Clara, Xilinx, Inc.	408-245-1361
CA	Thousand Oaks, SC Cubed	805-496-7307
CA	Tustin, SC Cubed	714-731-9206
CO	Longmont, Luscombe Engnr	303-772-3342
CT	Wallingford, John E. Boeing Co., Inc	203-265-1318
FL	Altamonte Springs, Semtronic	407-831-8233
FL	Clearwater, Semtronic	813-461-4675
FL	Ft. Lauderdale, Semtronic	305-731-2484
GA	Norcross, The Novus Group	404-263-0320
IL	Itasca, Beta Technology Sales	708-250-9586
IL	Schaumburg, Xilinx, Inc.	708-605-1972
IN	Carmel, Gen II Mktg	317-848-3083
IN	Ft. Wayne, Gen II Mktg	219-436-4485
IA	Cedar Rapids, Advanced Tech Sales	319-393-8280
KS	Olathe, Advanced Tech Sales	913-782-8702
KY	Louisville, Gen II Mktg	502-894-9903
MD	Baltimore, Micro Comp	410-644-5700
MA	Burlington, Genesis Assoc	617-270-9540
MI	Kentwood, Miltimore Sls Inc	616-554-9292
MI	Novi, Miltimore Sls Inc	313-349-0260
MN	Eden Prairie, Com-Tek	612-941-7181
MO	Bridgeton, Advanced Tech Sales	314-291-5003
NH	Nashua, Xilinx, Inc.	603-891-1096
NM	Albuquerque, Quatra Assocs	505-296-6781
NY	E. Syracuse, Electra Sls Corp	315-463-1248
NY	Melville, Parallax	516-351-1000
NY	Rochester, Electra Sls Corp	716-427-7860
NC	Cary, The Novus Group	919-460-7771
NC	Raleigh, Xilinx, Inc	919-846-3922
NC	Weddington, Novus Grp	704-846-4044
OH	Centerville, Bear Mktg, Inc.	513-436-2061
OH	Richfield, Bear Mktg	216-659-3131
OR	Portland, Thorson Company Northwest	503-293-9001
PA	Allison Park, Bear Mktg	412-492-1150
PA	Hatboro, Delta Tech Sales	215-957-0600
PA	Malvern, Xilinx, Inc.	215-296-8302
TN	Maryville, Novus Group	615-681-8895
TX	Austin, Bonser-Philhower Sales	512-346-9186
TX	Dallas, Xilinx, Inc	214-960-1043
TX	Houston, Bonser-Philhower Sales	713-782-4144
TX	Richardson, Bonser-Philhower Sales	214-234-8438
UT	Salt Lake City, Luscombe Engr	801-268-3634
VA	Lynchburg, Micro Comp. Inc.	804-239-2626
WA	Bellevue, Thorson Company Northwest	206-455-9180
WI	Milwaukee, Beta Technology Sales	414-543-6609
Can	British Columbia, Vancouver, Electro Source	604-275-2734
Can	British Columbia, Vancouver, Thorson Co. Northwest	206-455-9180
Can	Ontario, Kanata, Electro Source, Inc.	613-592-3214
Can	Ontario, Rexdale, Electro Source	416-675-4490
Can	Quebec, Pointe Claire, Electro Source	514-630-7486
Intl	Argentina, Buenos Aires, Reycom Electrna SRL	54-1-45-6459/49-7030
Intl	Australia, Bayswater, ACD	61-3-762-7644
Intl	Australia, Bentley, ACD	61-9-472-3232
Intl	Australia, Norwood, ACD	61-8-364-2844
Intl	Australia, Sydney, ACD	61-2-534-6200
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Intl	Belgium, Wemmel, Rodelco NV	32-2-460-0560
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Intl	Chile, Santiago, DTS Ltda	56-2-699-3316
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Intl	Germany, Numberg, Metronik GmbH	49-911-544966/68
Intl	Germany, Numberg, Avnet E2000	49-911-995161-0
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Intl	Germany, Stuttgart, Avnet E2000	49-7156-356-0
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Intl	Singapore, MEMEC Asia Pacific	866-65-222-4962
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Intl	United Kingdom, England, Xilinx Ltd	44-932-349401
PR	Hato Rey, Semtronic Assoc.	809-766-0700, 809-766-0701

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CA	Gardena, Hamilton/Avnet	213-217-6810
CA	Gardena, Hamilton/Avnet	213-327-3693
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CA	Milpitas, Marshall Ind.	408-942-4600
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IL	Bensenville, Hamilton/Avnet	708-860-7700
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IN	Carmel, Hamilton/Avnet	317-844-9333
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IA	Cedar Rapids, Hamilton/Avnet	319-362-4757
KS	Lenexa, Marshall Ind.	913-492-3121
KS	Lenexa, Hamilton/Avnet	913-888-8900
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MA	Peabody, Hamilton/Avnet	508-531-7430
MA	Wakefield, NU Horizons	617-246-4442
MA	Wilmington, Marshall Ind.	508-658-0810
MI	Grandville, Hamilton/Avnet	616-243-8805
MI	Livonia, Marshall Ind.	313-525-5850
MI	Novi, Hamilton/Avnet	313-347-4270
MN	Minnetonka, Hamilton/Avnet	612-932-0600
MN	Plymouth, Marshall Ind.	612-559-2211
MO	Bridgeton, Marshall Ind.	314-291-4650
MO	Chesterfield, Hamilton/Avnet	314-537-1600
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NJ	Fairfield, Hamilton/Avnet	201-575-3390
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NJ	Pine Brook, NU Horizons	201-882-8300
NM	Albuquerque, Hamilton/Avnet	505-345-0001
NY	Amityville, Nu Horizons	516-226-6000
NY	East Rochester, NU Horizons	716-248-5980
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NY	Hauppauge, Hamilton/Avnet	516-231-9800
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NY	N. Lindenhurst, Phase 1 Technology	516-957-4900
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NY	Rochester, Marshall Ind.	716-235-7620
NY	Syracuse, Hamilton/Avnet	315-437-2641
NY	Westbury, Hamilton/Avnet	516-997-6868
NC	Charlotte, Hamilton/Avnet	704-527-2485
NC	Raleigh, Hamilton/Avnet	919-878-0810
NC	Raleigh, Marshall Ind.	919-878-9882
OH	Dayton, Hamilton/Avnet	513-439-6730
OH	Dayton, Hamilton/Avnet	513-439-6700
OH	Dayton, Marshall Ind.	513-898-4480
OH	Solon, Marshall Ind.	216-248-1788
OH	Solon, Hamilton/Avnet	216-349-5100
OH	Westerville, Hamilton/Avnet	614-882-7004
OK	Tulsa, Hamilton/Avnet	918-664-0444
OR	Beaverton, Insight Electrns	503-644-3300
OR	Beaverton, Marshall Ind.	503-644-5050
OR	Beaverton, Hamilton/Avnet	503-627-0201
PA	Mars, Hamilton/Avnet	412-281-4150
PA	Pittsburgh, Marshall Ind.	412-788-0441
TX	Austin, Insight Electrns	512-250-0885
TX	Austin, Hamilton/Avnet	512-837-8911
TX	Austin, Marshall Ind.	512-837-1991
TX	Carrollton, Marshall Ind.	214-233-5200
TX	Carrollton, Marshall Ind.	214-233-5200
TX	Houston, Marshall Ind.	713-895-9200
TX	Irving, Hamilton/Avnet	214-550-6218
TX	Richardson, Insight Electrns	214-783-0800
TX	Sugar Land, Insight Electrns	713-879-0577
UT	Salt Lake City, Marshall Ind.	801-485-1551
UT	Salt Lake City, Hamilton/Avnet	801-972-2800
WA	Bothell, Marshall Ind.	206-486-5747
WA	Kirkland, Insight Electrns	206-820-8100
WA	Oak Harbor, Hamilton/Avnet	206-641-4199
WA	Redmond, Hamilton/Avnet	206-241-8555
WI	Waukesha, Hamilton/Avnet	414-784-4510
WI	Waukesha, Marshall Ind.	414-797-8400
Can	British Columbia, Burnaby, Hamilton/Avnet	604-420-4101
Can	Ontario, Brampton, Marshall Ind.	416-458-8046
Can	Ontario, Mississauga, Hamilton/Avnet	416-677-7432
Can	Ontario, Nepean, Hamilton/Avnet	613-226-1700
Can	Quebec, Pointe Claire, Marshall Ind.	514-694-8142
Can	Quebec, St. Laurent, Hamilton/Avnet	514-335-1000
PR	Rio Piedras, Hamilton/Avnet	809-731-1110

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CA	Quorum Tech Sales	408-980-0812
CA	Mesa Comps, Inc.	619-278-8021
CA	Pro Assoc	714-588-2700
CA	San Jose, Yamaha Corp. of America	408-437-3133, 800-543-7457
CO	Seale & Assoc, Inc.	303-695-1980
CT	SIR/DSA Group	203-243-9343
FL	PSR Technologies, Inc.	305-753-5732
GA	EnVision	404-840-1055
IL	Paltronics	708-616-9527
IN	STB & Assocs	317-844-9227
KS	Markline Technologies	913-681-8880
MD	Arbotek	410-825-0775
MA	SIR/DSA Group	508-480-0516
MA	SIR/DSA Group	508-692-2500
MI	Trilogy Mktg	313-338-2470
MN	James R. Johnson & Assoc.	612-478-9442
MO	Markline Technologies	314-625-6222
NJ	Eastec Assoc	201-934-7135
NY	Micro-Tech Mktg	716-426-0806
NY	Micro-Tech Mktg	607-771-8867
NY	Micro-Tech Mktg	914-255-7019
NC	EnVision	919-231-9939
OH	Infinity	317-984-4751
OK	Nova Mktg	918-660-5105
OR	Blair Hirsh Co.	503-641-1875
PA	Omni Sales	215-233-4600
SC	EnVision	803-699-3360

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TX	Austin, Nova Mktg	512-343-2321
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WA	Blair Hirsh Co.	206-774-8151
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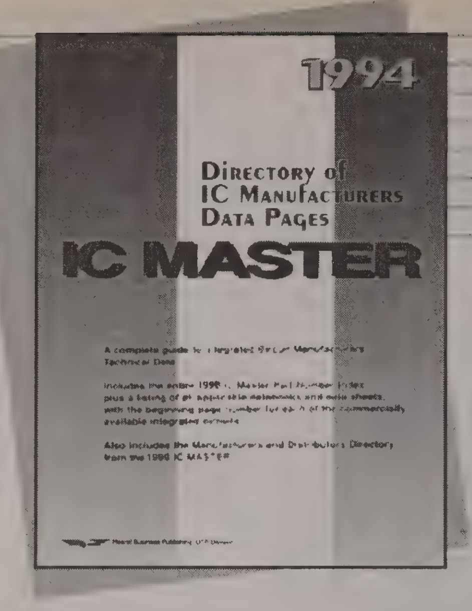
Intl	U.K., Maidenhead, Zilog, Inc.	44-628-392-00

ZYMOS INC., 477 N. Mathilda Ave., Sunnyvale, California 94086, Tel: 408-730-5400

Last Page This Section. Next Page Is 3201



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MILITARY PARTS DIRECTORY

Military Parts include devices reported by the Defense Electronics Supply Center (DESC), Dayton, OH 45444-5270. The Standardized Military Drawing (SMD) Numbers refer to either the MIL-M-38510 specification numbers or the Federal Stock Designators of Class 5962.

Military Device Screening Available
by Manufacturer

Military Parts Sorted by Function

Military Parts Sorted by SMD Number

Military Parts Sorted by Generic
Industry Part Number

	MIL-M-38510 QPL					MIL-STD-883 SCREENING		OTHER SCREENING		
MANUFACTURER	MEMORY	LINEAR	TTL	OTHER BIPOLAR	CMOS	CLASS B	CLASS S	MILITARY	INDUSTRIAL	RADIATION HARDENED
Advanced Analog						x	x	x	x	x
Advanced Linear Devices						x		x	x	
Advanced Micro Devices						x		x	x	
Altera						x		x	x	
Analog Devices		x		x	x	x	x	x	x	x
Analog Systems						x		x	x	
Apex Microechnology						x		x	x	
Applied Micro Circuits						x	x	x	x	x
Aptek Technologies						x		x	x	
Astec Semiconductor									x	
Atmel Corp.						x	x	x	x	
Avasem Corp.								x	x	
Benchmarq Microelectronics									x	
Burr-Brown		x				x	x	x	x	x
Catalyst Semiconductor						x		x	x	
Cherry Semiconductor									x	
Comlinear Corp.						x	Limited	x	x	
Crystal Semiconductor						x		x	x	
Cypress Semiconductor	x				x	x	x	x	x	Rad. Tol.
Datel						x	Limited	x	x	
Dense-Pac Microsystems						x		x	x	Rad. Tol.
Dionics Inc.				x		x		x	x	
ECI Semiconductor						x	x	x	x	
EG&G Reticon						x		x	x	
Elantec						x	x	x	x	x
EXEL Microelectronics						x			x	
Fujitsu Microelectronics						x			x	
Gennum Corp.						x	x	x	x	
Gould AMI						x	Limited	x	x	
Harris Semiconductor	x	x		x	x	x	x	x	x	x
Holt Integrated Circuits Inc.						x	x	x	x	
Honeywell Solid State Elec.					QML	x	x	x	x	x
Hughes Aircraft						x	x	x	x	x
Ideal Semiconductor						x	x	x	x	x
ILC Data Device Corp.						x	x	x	x	x
Integrated Device Technology						x		x	x	x
Intel Corp.	x			µP		x		x	x	
Int'l Microcircuits			x		x	x	Limited	x	x	x
Int'l Microelectronic Products						x		x	x	
Interpoint						x	x	x	x	x
Intronics						x		x	x	
Lansdale Semiconductor Inc.	x	x	x	x		x		x	x	
Lattice Semiconductor					x	x			x	Rad. Tol.
Linear Integrated Systems						x		x	x	x
Linear Technology Corp.		x				x	x	x	x	x
Logic Devices	x				x	x		x	x	
Logical Solutions					x	x		x	x	
LSI Computer Systems						x	x	x	x	
Maxim Integrated Products						x		x	x	
Micrel						x	x	x	x	x
Microchip Technology Inc.						x		x	x	
Micro Networks						x		x	x	
Micro Linear		x	x	x		x		x	x	x
Micro Power Systems						x	x	x	x	x
Mitel Semiconductor						x		x	x	

	MIL-M-38510 QPL					MIL-STD-883 SCREENING		OTHER SCREENING		
MANUFACTURER	**MEMORY**	**LINEAR**	**TTL**	**OTHER BIPOLAR**	**CMOS**	**CLASS B**	**CLASS S**	**MILITARY**	**INDUSTRIAL**	**RADIATION HARDENED**
Mosaic Semiconductor	x						x		x	x x
Motorola Semiconductor	x	x	x	x	x	x	x	x	x	
MSI/Scorpion Semiconductor	x				x	x	x	x	x	
MX-COM						x		x	x	
National Semiconductor	x	x	x	x	x	x	x	x	x	x
NCM Corp.					x	x		x	x	x
Newbridge Microsystems					x	x	x	x	x	
Optical Electronics Inc.		x		x		x		x	x	
Paradigm Technology	x				x	x		x	x	
Performance Semiconductor						x		x	x	
Philips	x	x				x	x	x	x	
Proxim, Inc.						x	Limited	x	x	
Qualcomm						x	x	x	x	x
Quality Semiconductor						x		x	x	
Raytheon Semiconductor	x	x	x	x		x	x	x	x	x
R & E International								x	x	
Rochester Electronics Inc.						x	Limited	x	x	
Samsung Microwave						x	x	x	x	
SemTech						x		x	x	
Signal Processing Technologies						x		x	x	
Silicon General		x		x	x	x	x	x	x	x
Siliconix						x		x	x	
Sipex		x		x	x	x	x	x	x	x
Solitron		x				x	x	x	x	
Space Research Tech, Inc.					x	x		x	x	
Standard Microsystems Corp.									x	
STC Semiconductors						x	Limited	x	x	
Sunshine Semiconductor					x	x		x	x	
Technitrol						x		x	x	
Teledyne Components								x	x	
Texas Instruments	x	x	x	x		x	x	x	x	
TriQuint						x	x	x	x	
TRW LSI						x		x	x	
Unitrode Corp.		x		x		x	x	x	x	
United Tech Micro Ctr.	x				x	x	x	x	x	x
Vitesse Semiconductor						x	x	x	x	
VLSI Technology Inc.						x		x	x	
Xicor		x			x	x	Limited	x	x	
Xilinx						x		x	x	

EXPLANATION:

The "MIL-M-38510" section indicates the IC manufacturers currently providing Q.P.L. ICs. More detailed information on the specific devices is given in the Qualified Products Listings which are at the end of this section.

The "MIL-STD-883 Screening" section lists those manufacturers who are both set up and actively want to screen devices to the levels indicated.

"Other Screening" shows those who report that they want business calling for special military and industrial environmental screening procedures.

MILITARY PARTS SORTED BY FUNCTION

Gates 1 /

AND GATE DUAL 4-INPUT

Industry P/N	Military* PN
4082B	5962-7705901
54HC21	5962-8857601
54AS21	5962-8780401
54F21	5962-8955401
54ALS21	5962-8414301
4082B	/17002
54LS21	/31003

AND GATE HEX

Industry P/N	Military* PN
10597	/06202

AND GATE QUAD 2-INPUT

Industry P/N	Military* PN
54C08	5962-7703601
4081B	/17001
4081B	5962-7702401
5408	/01601
54F08	/34001
54ALS08	5962-8684201
4081B	5962-7702402
10H504	5962-8750401
54F11	/34002
54S08	/08003
54ALS08	/37401
54LS08	/31004
54AC08	/75203
54AC08	5962-8761501
54HC08	5962-8404701
54AC11008	5962-8761502
54HC08	/65203

AND GATE QUAD 2-INPUT WITH OPEN-COLLECTOR OUTPUTS

Industry P/N	Military* PN
54ALS09	5962-8414201
54LS09	5962-8001901
54F09	5962-8872301
5409	/01602
54S09	/08004
54LS09	/31005

AND GATE QUAD 2-INPUT WITH OPEN-DRAIN OUTPUTS

Industry P/N	Military* PN
54HC09	5962-8862001

AND GATE QUAD 2-INPUT WITH TTL-COMPATIBLE INPUTS

Industry P/N	Military* PN
54ACT11008	5962-8954701
54HCT08	5962-8688301
54ACT08	5962-8954702

AND GATE TRIPLE 3-INPUT

Industry P/N	Military* PN
4073B	5962-7705101
54ALS11A	5962-8684101
54S11	/08001
54LS11	/31001
4073B	/17003
54ALS11	/37402
54AC11	5962-8761101
54AC11011	5962-8761102
54AC11	/75204
54HC11	5962-8404801
54HC11	/65204

AND GATE TRIPLE 3-INPUT WITH OPEN-COLLECTOR INPUTS

Industry P/N	Military* PN
54LS15	/31002
54S15	/08002

AND GATE TRIPLE 3-INPUT WITH TTL-COMPATIBLE INPUTS

Industry P/N	Military* PN
54HCT11	5962-8970901

AND-OR-INVERT GATE

Industry P/N	Military* PN
54LS54	/30402

AND-OR-INVERT GATE 2-2-2-3 INPUT

Industry P/N	Military* PN
54H53	/04003
54H54	/04004

AND-OR-INVERT GATE 2-WIDE 4-INPUT

Industry P/N	Military* PN
54H55	/04005
54L55	/04103

AND-OR-INVERT GATE 4-2-2-2 INPUT

Industry P/N	Military* PN
54F64	/33401

AND-OR-INVERT GATE 4-WIDE

Industry P/N	Military* PN
5454	/00504

AND-OR-INVERT GATE 4-WIDE 2-INPUT

Industry P/N	Military* PN
5453	/00503
4086B	/17202

AND-OR-INVERT GATE 4-WIDE 3-2-2-3 INPUT

Industry P/N	Military* PN
54L54	/04102

AND-OR-INVERT GATE DUAL 2-WIDE

Industry P/N	Military* PN
54H51	/04002
54LS51	/30401
5450	/00501
5451	/00502
54L51	/04101

AND-OR-INVERT GATE DUAL 2-WIDE 2-INPUT

Industry P/N	Military* PN
54H50	/04001
54S51	/07401
4085B	/17201

AND-OR-INVERT GATE DUAL 2-WIDE 2-INPUT 2-WIDE 3-INPUT

Industry P/N	Military* PN
54F51	5962-8877401

AND-OR-INVERT GATE QUAD 4-2-3-2 INPUT

Industry P/N	Military* PN
54S65	/07403

AND-OR-INVERT GATE QUAD 4-2-3-2-INPUT

Industry P/N	Military* PN
54S64	/07402

AND/NAND GATE QUAD 2-INPUT

Industry P/N	Military* PN
10504	/06201

AND/OR SELECT GATE QUAD

Industry P/N	Military* PN
4019A	/05302
4019B	/05352

COMPLIMENTARY PAIR DUAL

Industry P/N	Military* PN
4007A	/05301
4007UB	/05351

EXCLUSIVE-NOR GATE QUAD

Industry P/N	Military* PN
4077B	/17204

EXCLUSIVE-NOR GATE QUAD 2-INPUT

Industry P/N	Military* PN
54LS266	/30303
54HC7266	5962-8404302
54HC7266	/65105

EXCLUSIVE-NOR GATE QUAD 2-INPUT (OPEN DRAIN OUTPUT)

Industry P/N	Military* PN
54HC266	5962-8404301
54HC266	/65103

EXCLUSIVE-OR GATE QUAD

Industry P/N	Military* PN
10H513	5962-8755801
4070B	/17203

EXCLUSIVE-OR GATE QUAD 2-INPUT

Industry P/N	Military* PN
54F86	/34501
54L86	/02601
5486	/00701
54AC86	5962-8955001
54ALS86	5962-8862101
54S86	/07501
54LS86	/30502
54AC86	/75202
54HC86	5962-8404601
4030A	/05303
54HC86	/65202
4030B	/05353

EXCLUSIVE-OR GATE QUAD 2-INPUT TTL-COMPATIBLE INPUTS

Industry P/N	Military* PN
54HCT86	5962-8984401

EXCLUSIVE-OR/NOR GATE QUAD

Industry P/N	Military* PN
54S135	/07502

EXCLUSIVE-OR/NOR GATE TRIPLE 2-INPUT

Industry P/N	Military* PN
10H507	5962-8772701
10507	/06005

HEX INVERTER

Industry P/N	Military* PN
4069UB	/17401
54HC04	/65701
54HC04	5962-8409801
54AC04	/75701
4069UB	5962-7702701
54AC04	5962-8760901
54AC11004	5962-8760902
MIC935	/03002
54F04	/33002
936	/03003
54ALS04B	5962-8684301
54S04	/07003
54LS04	/30003
54L04	/02005
54H04	/02305
5404	/00105
54ALS04B	/37006

HEX INVERTER SCHMITT TRIGGER

Industry P/N	Military* PN
40106B	5962-8550101
54HC14	5962-8409101
54AC14	5962-8762401
54F14	5962-8875201
54LS14	/31302
54AC14	/75702
54HC14	/65702
5414	/15102
40106B	/17702
14584	5962-8550102

HEX INVERTER SCHMITT TRIGGER WITH TTL-COMPATIBLE INPUTS

Industry P/N	Military* PN
54HCT14	5962-8689001
54HCT14	/65752

HEX INVERTER TTL-COMPATIBLE INPUTS

Industry P/N	Military* PN
54ACT04	5962-8973401
54HCT04	/65751
54ACT11004	5962-8973402
54HCT04	5962-8974701

HEX INVERTER UNBUFFERED

Industry P/N	Military* PN
54HCU04	5962-8601001

HEX INVERTER WITH ENABLE

Industry P/N	Military* PN
10H589	5962-8751001

HEX INVERTER WITH OPEN-COLLECTOR OUTPUTS

Industry P/N	Military* PN
54ALS05A	5962-8854001
54LS05	/30004
54S05	/07004
5405	/00108

HEX INVERTER WITH OPEN-DRAIN OUTPUTS

Industry P/N	Military* PN
54HC05	5962-8871801

MULTIFUNCTION GATE 8-INPUT

Industry P/N	Military* PN
4048A	/05304
4048B	/05354

NAND GATE 12-INPUT TS

Industry P/N	Military* PN
54S134	/07010

NAND GATE 13-INPUT

Industry P/N	Military* PN
54ALS133	5962-8859001
54HC133	5962-8772301
54ALS133	/37005
54S133	/07009

NAND GATE 8-INPUT

Industry P/N	Military* PN
5430	/00101
54L30	/02001
54H30	/02301
54F30	5962-8870801
54ALS30A	5962-8683701
54HC30	/65004
54ALS30A	/37004
54HC30	5962-8404001
54AC11030	/75024
54S30	/07008
54LS30	/30009

NAND GATE 8-INPUT TTL-COMPATIBLE INPUTS

Industry P/N	Military* PN
54HCT30	5962-8974601

NAND GATE DUAL 4-INPUT

Industry P/N	Military* PN
930	/03001
54ALS20A	5962-8858901
5413	/15101
54H20	/02302
4012A	/05002
54L20	/02002
5420	/00102
54AC20	/75003
54HC20	5962-8403901
54HC20	/65003
54ALS20A	/37003
54F20	/33004
4012B	/05052
54S20	/07006
54AC11020	/75023
54LS20	/30007
54AC20	5962-8761301
54AC11020	5962-8761302

NAND GATE DUAL 4-INPUT SCHMITT TRIGGER

Industry P/N	Military* PN
54LS13	/31301

NAND GATE DUAL 4-INPUT WITH OPEN-COLLECTOR OUTPUTS

Industry P/N	Military* PN
54H22	/02307
54S22	/07007
54LS22	/30008

NAND GATE QUAD 2-INPUT

Industry P/N	Military* PN
54LS00	/30001
54ALS00A	/37001
54AC00	/75001
54F00	/33001
54AC00	5962-8754901
54HC00	/65001
54HC00	5962-8403701
4011A	/05001
54S00	/07001
54ALS00A	5962-8683301
54AC11000	5962-8754902
54H00	/02304
5400	/00104
54L00	/02004
54AC1100	/75021
4011B	/05051
946	/03004
54L01	/02006

NAND GATE QUAD 2-INPUT HIGH-VOLTAGE WITH OPEN-COLLECTOR OUTPUTS

Industry P/N	Military* PN
54LS26	/32102
54LS26	5962-7602001

NAND GATE QUAD 2-INPUT SCHMITT TRIGGER

Industry P/N	Military* PN
54LS132	5962-7600401
54LS132	/31303
54132	/15103
54HC132	5962-8984502
54HC132	/65005

NAND GATE QUAD 2-INPUT SCHMITT TRIGGER TTL-COMPATIBLE INPUTS

Industry P/N	Military* PN
54HCT132	5962-8984501

NAND GATE QUAD 2-INPUT WITH OPEN DRAIN OUTPUTS

Industry P/N	Military* PN
54HC03	5962-8764701

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*Part numbers beginning with a slash "/" are MIL-M-38510 numbers. All others are DESC drawing numbers.

Industry P/N	Military* PN
NAND GATE QUAD 2-INPUT WITH OPEN-COLLECTOR OUTPUTS	
54S03	/07002
54LS03	/30002
54H01	/02306
5401	/00107
5403	/00109
NAND GATE QUAD 2-INPUT WITH SCHMITT TRIGGERS	
4093B	5962-7704601
4093B	/17701
4093B	5962-7704602
NAND GATE QUAD 2-INPUT WITH TTL-COMPATIBLE INPUTS	
54ACT00	5962-8769901
54HCT00	5962-8683101
54ACT11000	5962-8769902
NAND GATE TRIPLE 3-INPUT	
54ALS10A	5962-8686501
4023B	5962-7901301
54HC10	5962-8403801
54ALS10	/37002
54HC10	/65002
54AC10	/75002
4023A	/05003
54AC10	5962-8761001
5410	/00103
54F10	/33003
54H10	/02303
54L10	/02003
54AC11010	5962-8761002
54S10	/07005
54AC11010	/75022
962	/03005
54LS10	/30005
4023B	/05053
NAND GATE TRIPLE 3-INPUT TTL-COMPATIBLE INPUTS	
54HCT10	5962-8984301
NAND GATE TRIPLE 3-INPUT WITH OPEN-COLLECTOR OUTPUTS	
54LS12	/30006
5412	/00106
NOR GATE 8-INPUT	
4078B	5962-7704401
NOR GATE DUAL 3-INPUT	
4000A	/05201
4000B	/05251
NOR GATE DUAL 4-INPUT	
4002A	/05203
4002B	/05253
54HC4002	/65104
54HC4002	5962-8404401
NOR GATE DUAL 4-INPUT W/STROBE	
5423	/00402
5425	/00403
NOR GATE QUAD 2-INPUT	
54ALS02	/37301
5402	/00401
54F02	/33301
54S02	/07301
54LS02	/30301
10H502	5962-8755701
54F36	5962-8870901
4001A	/05202
54L02	/02701
54ALS02	5962-8684401
54HC02	5962-8404101
54HC02	/65101
4001B	/05252
54AC02	5962-8761201
54AC11002	5962-8761202
54AC02	/75101
NOR GATE QUAD 2-INPUT TTL-COMPATIBLE INPUTS	
54HCT02	5962-8975101
NOR GATE TRIPLE 3-4-3 INPUT	
10506	/06004
NOR GATE TRIPLE 3-INPUT	
54F27	5962-8951001
54ALS27	/37302
54LS27	/30302
54ALS27	5962-8683801
5427	/00404
4025A	/05204
54HC27	5962-8404201
54HC27	/65102
4025B	/05254
NOR GATE TRIPLE 3-INPUT TTL-COMPATIBLE INPUTS	
54HCT27	5962-8970301
NOR GATE TRIPLE 4-3-3 INPUT	
10H506	5962-8756401
NOR-OR/NOR GATE	
10502	/06002
NOR/OR GATE 8-INPUT	
54HC4078	5962-8857401
4078B	5962-7704402
OR GATE DUAL 4-INPUT	
4072B	5962-7706001
4072B	/17102
OR GATE DUAL THREE-INPUT THREE-OUTPUT	
10H610	5962-8754101
OR GATE QUAD 2-INPUT	
5432	/16101
54ALS32	5962-8683601
10H503	5962-8756501
54F32	/33501
4071B	/17101
54ALS32	/37501
54LS32	/30501
54AC32	/75201
54HC32	5962-8404501
54HC32	/65201
54AC32	5962-8761401
OR GATE QUAD 2-INPUT WITH TTL-COMPATIBLE INPUTS	
54ACT32	5962-8973601
54HCT32	5962-8685201
54ACT11032	5962-8973602
OR GATE TRIPLE 3-INPUT	
54HC4075	5962-8772201
4075B	/17103
OR-AND GATE 4-WIDE 4-3-3-3 INPUT	
10H519	5962-8772801
OR-AND GATE DUAL 2-WIDE 3-INPUT	
10H518	5962-8755901
OR-AND/OR-AND-INVERT GATE 3-INPUT	
10521	5962-8857701
OR-AND/OR-AND-INVERT GATE 4-WIDE	
10H521	5962-8773001
OR/NOR GATE DUAL 3-INPUT	
10612	5962-8775001
OR/NOR GATE DUAL 4-5 INPUT	
10H509	5962-8985601
10H609	5962-8756901
10509	/06006
OR/NOR GATE QUAD 2-INPUT	
10H501	5962-8750301
10501	/06001
OR/NOR GATE QUINT 2-INPUT	
100302	5962-9152802
OR/NOR GATE TRIPLE 2-3-2 INPUT	
10H505	5962-8750701
10505	/06003
OR/NOR GATE TRIPLE 5-INPUT	
100301	5962-9152801

Buffers 2/

Industry P/N	Military* PN
BUFFER 10-BIT HIGH PERFORMANCE WITH THREE-STATE OUTPUTS	
29827A	5962-8860501
29828A	5962-8860502
BUFFER HEX INVERTING LOGIC LEVEL CONVERTER	
54HC4049	5962-8681901
BUFFER NAND DUAL 4-INPUT	
932	/03101
BUFFER NAND DUAL 4-INPUT WITH OPEN-COLLECTOR OUTPUTS	
944	/03102
BUFFER NAND QUAD 2-INPUT	
957	/03103
BUFFER NAND QUAD 2-INPUT WITH OPEN-COLLECTOR OUTPUTS	
958	/03104
BUFFER QUAD THREE-STATE	
54F125	5962-9078101
BUFFER QUAD THREE-STATE TTL-COMPATIBLE INPUTS	
54HCT126	5962-9065101
BUFFER/DRIVER AND HEX 2-INPUT	
54AS808	5962-8852201
BUFFER/DRIVER AND QUAD 2-INPUT	
54ALS1008A	5962-8409701
54ALS1008A	/38404
BUFFER/DRIVER AND TRIPLE 3-INPUT	
54ALS1011	/38406
BUFFER/DRIVER HEX INVERTING	
54AS1004A	5962-8872901
4009A	/05501
54ALS1004	5962-8406101
4009UB	/05551
54ALS1004	/38409
BUFFER/DRIVER HEX INVERTING STROBED THREE-STATE OUTPUTS	
4520B	5962-7702001
4502B	/17403
BUFFER/DRIVER HEX INVERTING WITH OPEN-COLLECTOR OUTPUTS	
5406	/00801
5416	/00802
54ALS1005	/38410
BUFFER/DRIVER HEX INVERTING WITH THREE-STATE OUTPUTS	
54HC368	5962-8681201
54LS366	/32202
54HC368	/65709
54368	/16304
BUFFER/DRIVER HEX NONINVERTING	
54ALS1034	5962-8403101
4010A	/05502
54AS1034A	5962-8873101
4010B	/05552
54ALS1034	/38411
BUFFER/DRIVER HEX NONINVERTING WITH OPEN-COLLECTOR OUTPUTS	
54ALS1035	5962-8874201
5407	/00803
5417	/00804
54ALS1035	/38412
BUFFER/DRIVER HEX NONINVERTING WITH OPEN-DRAIN OUTPUTS	
54C906	5962-7705601
BUFFER/DRIVER HEX NONINVERTING WITH THREE-STATE OUTPUTS	
54F365	/35101
54LS365	/32201
54HC367	/65708
54HC365	5962-8500101
54HC367	5962-8500201
54365	/16301
54366	/16302
54LS367	/32203
54367	/16303
54HC365	/65706
BUFFER/DRIVER NAND DUAL 2-INPUT	
40107B	/17402
BUFFER/DRIVER NAND DUAL 4-INPUT	
54H40	/02401
54S40	/07201
5440	/00301
54LS40	/30201
54F40	/35203
54ALS1020	/38407
BUFFER/DRIVER NAND HEX 2-INPUT	
54AS804	5962-8776601
BUFFER/DRIVER NAND QUAD 2-INPUT	
54ALS1000A	5962-8405901
54F37	/35201
5437	/00302
54LS37	/30202
54ALS1000A	/38401
BUFFER/DRIVER NAND QUAD 2-INPUT WITH OPEN-COLLECTOR OUTPUTS	
54ALS38A	5962-8687101
54F38	5962-8687201
54F38	/35202
54LS38	/30203
5438	/00303
54ALS1003	/38403
BUFFER/DRIVER NAND TRIPLE 3-INPUT	
54ALS1010A	5962-8406001
54ALS1010A	/38405
BUFFER/DRIVER NOR HEX 2-INPUT	
54AS805	5962-8779401

*Part numbers beginning with a slash "/" are MIL-M-38510 numbers. All others are DESC drawing numbers.

MILITARY PARTS SORTED BY FUNCTION

BUFFER/DRIVER NOR QUAD 2-INPUT

Industry P/N	Military* PN
5428	/16201
54LS28	5962-8512602
54LS28	/30204
54ALS1002	/38402

BUFFER/DRIVER NOR QUAD 2-INPUT WITH OPEN-COLLECTOR OUTPUTS

Industry P/N	Military* PN
54LS33	5962-8512601

BUFFER/DRIVER OCTAL HIGH-CURRENT WITH OPEN-COLLECTOR OUTPUTS

Industry P/N	Military* PN
54F30244	5962-8872201

BUFFER/DRIVER OCTAL INVERTING THREE-STATE OUTPUTS

Industry P/N	Military* PN
25S240	5962-8672401

BUFFER/DRIVER OCTAL INVERTING WITH THREE-STATE OUTPUTS

Industry P/N	Military* PN
54AC240	/75703
54HCT240	5962-8550501
54F240	/33201
54AC240	5962-8755001
54HCT240	/65753
54ALS240A	5962-8859101
54ALS240A	/38301
54LS540	5962-8415501
54LS240	5962-7801201
54HC240	/65703
54HC240	5962-8407401
54AC11240	5962-8755002
54LS240	/32401
54HC540	/65710
54F540	/33204
54LS540	/32404

BUFFER/DRIVER OCTAL INVERTING WITH THREE-STATE OUTPUTS TTL-COMPATIBLE

Industry P/N	Military* PN
54ACT11240	5962-8775902
54FCT240	5962-8765501
54FCT240A	5962-8765502
54FCT540	5962-8976701
54FCT540A	5962-8976702

BUFFER/DRIVER OCTAL NON-INVERTING WITH OPEN-COLLECTOR OUTPUTS

Industry P/N	Military* PN
54AS760	5962-8776701

BUFFER/DRIVER OCTAL NON-INVERTING WITH THREE-STATE OUTPUTS

Industry P/N	Military* PN
54ALS541	5962-8960201
54ALS1244A	5962-8873801
54HC244	5962-8409601
54F241	5962-8687401
54ALS241	5962-8859601
54HCT244	5962-8513001
54ALS244A	5962-8683901
54AC541	5962-8870601
25S244	5962-8753601
54AC541	/75711
54HCT541	/65761
54F241	/33202
54LS244	5962-7705701
54HC241	/65704
25S241	5962-8672501
54LS541	5962-8415601
54HCT241	/65754
54AC241	/75704
54ALS241	/38302
54HC244	/65705
54F244	/33203
54AC241	5962-8755101
54ALS244A	/38303
54HCT244	/65755
54AC244	/75705
54AC11241	5962-8755102
54HC541	/65711
54LS241	/32402
54AC244	5962-8755201
54LS244	/32403
54AC11244	5962-8755202
54LS541	/32405

BUFFER/DRIVER OCTAL NON-INVERTING WITH THREE-STATE OUTPUTS AND TTL-COMP.INPUTS

Industry P/N	Military* PN
54ACT11244	5962-8776002

BUFFER/DRIVER OCTAL NON-INVERTING WITH THREE-STATE OUTPUTS TTL-COMPATIBLE

Industry P/N	Military* PN
54ACT241	5962-8984701
54FCT541	5962-8976601
54FCT241	5962-8973201
54FCT244	5962-8763001
54FCT241A	5962-8973202
54ACT11241	5962-8984702
54FCT541A	5962-8976602
54FCT244A	5962-8763002
54ACT244	5962-8776001

BUFFER/DRIVER OCTAL WITH OPEN-COLLECTOR OUTPUTS

Industry P/N	Military* PN
54AS756	5962-9056301

BUFFER/DRIVER OR HEX 2-INPUT

Industry P/N	Military* PN
54AS832B	5962-8852301

BUFFER/DRIVER OR QUAD 2-INPUT

Industry P/N	Military* PN
54ALS1032	/38408

BUFFER/DRIVER QUAD 2-INPUT INVERTING

Industry P/N	Military* PN
5426	/00805

BUFFER/DRIVER QUAD NON-INVERTING WITH THREE-STATE OUTPUTS

Industry P/N	Military* PN
54LS125A	/32301
54HC126	5962-8684801
54125	/15301
54126	/15302
54LS126	/32302

BUFFER/DRIVER QUAD NON-INVERTING WITH THREE-STATE OUTPUTS (LOW ENABLE)

Industry P/N	Military* PN
54HC125	5962-8772101

BUFFER/LINE DRIVER OCTAL WITH INVERTING THREE-STATE OUTPUTS

Industry P/N	Military* PN
54BCT240	5962-9074201

BUS BUFFER GATE QUAD WITH THREE-STATE OUTPUTS

Industry P/N	Military* PN
54BCT125	5962-9093701

BUS BUFFER 10-BIT INVERTING HIGH PERFORMANCE

Industry P/N	Military* PN
29C828	5962-8766702
29C928	5962-8766704

BUS BUFFER 10-BIT NONINVERTING HIGH PERFORMANCE

Industry P/N	Military* PN
29C827	5962-8766701
29C927	5962-8766703

BUS BUFFER QUAD WITH THREE-STATE OUTPUTS

Industry P/N	Military* PN
54BCT126	5962-9088901

BUS BUFFER/SEPARATOR 4-BIT

Industry P/N	Military* PN
1856	/47601
1857	/47602

EXTENDER DUAL 4-INPUT

Industry P/N	Military* PN
933	/03105

HEX BUFFER NONINVERTING

Industry P/N	Military* PN
4050A	/05504
4050B	/05554

HEX BUFFER WITH ENABLE

Industry P/N	Military* PN
10H588	5962-8750901

HEX INVERTER BUFFER

Industry P/N	Military* PN
4049UB	5962-7901401
4049A	/05503
4049UB	/05553

LOGIC-LEVEL CONVERTER ECL-TO-TTL

Industry P/N	Military* PN
10H525	5962-8750801

LOGIC-LEVEL CONVERTER TTL-TO-ECL QUAD

Industry P/N	Military* PN
10H524	5962-8756001

OR DRIVER QUAD 2-INPUT

Industry P/N	Military* PN
54AS1032A	5962-8873001

POWER BUFFER FAST Ò150 MA

Industry P/N	Military* PN
LT1010	5962-8856201

REGISTERED TRANSCEIVER BIDIRECTIONAL I/O PORTS INVERTING 8-BIT

Industry P/N	Military* PN
2953A	5962-8777202

TRUE/COMPLIMENT BUFFER QUAD

Industry P/N	Military* PN
4041A	/05505
4041UB	/05555

VOLT. LEVEL SHIFTER ECL TO TTL QUAD

Industry P/N	Military* PN
10525	/06302

VOLT. LEVEL SHIFTER LOW TO HIGH

Industry P/N	Military* PN
40109B	/17404

VOLT. LEVEL SHIFTER TTL TO ECL QUAD

Industry P/N	Military* PN
10524	/06301

Flip-Flops 3/

BUS INTERFACE FLIP-FLOP 10-BIT WITH INVERTING INPUTS AND THREE-STATE OUTPUTS

Industry P/N	Military* PN
54AS822	5962-9078002

BUS INTERFACE FLIP-FLOP 10-BIT WITH NONINVERTING INPUTS AND THREE-STATE OUTPUT

Industry P/N	Military* PN
54AS821	5962-9078001

BUS INTERFACE FLIP-FLOP 8-BIT WITH INVERTING INPUTS AND THREE-STATE OUTPUTS

Industry P/N	Military* PN
54AS826	5962-9078004

BUS INTERFACE FLIP-FLOP 8-BIT WITH NONINVERTING INPUTS AND THREE-STATE OUTPUTS

Industry P/N	Military* PN
54AS825	5962-9078003

FLIP-FLOP BINARY

Industry P/N	Military* PN
950	/03303

FLIP-FLOP BUS INTERFACE WITH THREE-STATE OUTPUTS

Industry P/N	Military* PN
54AS823	5962-8952501

FLIP-FLOP D-TYPE MASTER SLAVE DUAL

Industry P/N	Military* PN
10H531	5962-8756101

FLIP-FLOP D-TYPE MASTER SLAVE HEX

Industry P/N	Military* PN
10H576	5962-8751201

FLIP-FLOP D-TYPE MASTER SLAVE HEX WITH RESET

Industry P/N	Military* PN
10H586	5962-8756301

FLIP-FLOP D-TYPE 10-BIT WITH THREE-STATE OUTPUTS AND TTL-COMPATIBLE INPUTS

Industry P/N	Military* PN
54AC821	5962-9160601
54ACT821	5962-8870501

FLIP-FLOP D-TYPE 9-BIT POS. EDGE-TRIGGERED TTL-COMP INPUTS TS-OUTPUTS

Industry P/N	Military* PN
54ACT823	5962-9161001

FLIP-FLOP D-TYPE DUAL

Industry P/N	Military* PN
54S74	/07101
54F074	/34101
4013B	5962-7901101
10531	/06101
4013A	/05101
10631	/06102
54LS74A	/30102
4013B	5962-7901102
4013B	/05151
54L74	/02105
5474	/00205
5479	/00207
54H74	/02203

FLIP-FLOP D-TYPE DUAL 4-BIT WITH CLEAR AND THREE-STATE OUTPUTS

Industry P/N	Military* PN
54ALS874B	5962-8401001
54ALS874B	/37106

FLIP-FLOP D-TYPE DUAL 4-BIT WITH PRESET AND THREE-STATE INVERTED OUTPUTS

Industry P/N	Military* PN
54ALS876	5962-8401002
54ALS876	/37107

FLIP-FLOP D-TYPE DUAL 4-BIT WITH TRUE OUTPUTS

Industry P/N	Military* PN
54AS874	5962-9152901

FLIP-FLOP D-TYPE DUAL POSITIVE EDGE-TRIGGERED

Industry P/N	Military* PN
54ALS74A	/37101
54AC11074	5962-8852002
54ALS74A	5962-8401101

FLIP-FLOP D-TYPE DUAL POSITIVE EDGE-TRIGGERED WITH CLEAR AND SET

Industry P/N	Military* PN
54AC74	5962-8852001
54AC74	/75302

FLIP-FLOP D-TYPE DUAL WITH PRESET AND CLEAR

Industry P/N	Military* PN
54HC74	5962-8405601
54HC74	/65302

FLIP-FLOP D-TYPE DUAL WITH PRESET AND CLEAR AND TTL-COMPATIBLE INPUTS

Industry P/N	Military* PN
54ACT74	5962-8752501
54ACT11074	5962-8752502

FLIP-FLOP D-TYPE DUAL WITH PRESET AND CLEAR WITH LSTTL-COMPATIBLE INPUTS

Industry P/N	Military* PN
54HCT74	5962-8685301
54HCT74	/65352

FLIP-FLOP D-TYPE HEX

Industry P/N	Military* PN
25LS174	/33106
54174	/01701
40174B	5962-8202201
10576	/06103
40174B	/17505
54LS174	/30106
54F174	/34107

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Industry P/N	Military* PN
FLIP-FLOP D-TYPE HEX WITH CLEAR	
54ALS174	5962-8301901
54HC174	5962-8407301
54HC174	/65307
54ALS174	/37201
FLIP-FLOP D-TYPE HEX WITH COMMON RESET	
10586	5962-8779301
FLIP-FLOP D-TYPE HEX WITH ENABLE	
54LS378	5962-8992501
FLIP-FLOP D-TYPE HEX WITH MASTER RESET	
54AC174	5962-8762601
54AC174	/75307
FLIP-FLOP D-TYPE HEX WITH MASTER RESET AND TTL-COMPATIBLE INPUTS	
54ACT174	5962-8775701
FLIP-FLOP D-TYPE HEX WITH RESET TTL COMPATIBLE-INPUTS	
54HCT174	5962-8974301
FLIP-FLOP D-TYPE OCTAL	
54LS377	/32504
FLIP-FLOP D-TYPE OCTAL INVERTING POS. EDGE-TRIGGERED WITH 3-STATE OUTPUTS	
54HCT534	5962-8984901
FLIP-FLOP D-TYPE OCTAL WITH INVERTED THREE-STATE OUTPUTS TTL COMPATIBLE	
54BCT534	5962-9074701
FLIP-FLOP D-TYPE OCTAL EDGE-TRIGGERED WITH ASYNCHRONOUS MASTER RESET	
54F273	5962-8855001
FLIP-FLOP D-TYPE OCTAL EDGE-TRIGGERED WITH CLOCK ENABLE	
54F377	5962-9091001
FLIP-FLOP D-TYPE OCTAL EDGE-TRIGGERED WITH INVERTED THREE-STATE OUTPUTS	
54HC564	5962-8681501
54HC564	/65606
FLIP-FLOP D-TYPE OCTAL EDGE-TRIGGERED WITH THREE-STATE OUTPUTS	
54BCT374	5962-9051601
54ALS564A	5962-8872801
54ALS374	5962-8302002
54ALS374	/37204
FLIP-FLOP D-TYPE OCTAL POSITIVE EDGE-TRIGGERED WITH THREE-STATE OUTPUTS	
54LS374	5962-7801101
54LS374	/32503
FLIP-FLOP D-TYPE OCTAL WITH CLEAR	
54LS273	5962-7801001
54HC273	5962-8409901
54ALS273	5962-8413601
54AC273	/75601
54LS273	/32501
54AC273	5962-8775601
54HC273	/65601
FLIP-FLOP D-TYPE OCTAL WITH CLEAR AND TTL-COMPATIBLE INPUTS	
54HCT273	5962-8772501
FLIP-FLOP D-TYPE OCTAL WITH CLEAR TTL-COMPATIBLE	
54FCT273	5962-8765601
54FCT273A	5962-8765602
FLIP-FLOP D-TYPE OCTAL WITH CLOCK ENABLE	
54AC377	5962-8870201
54AC377	/75603
FLIP-FLOP D-TYPE OCTAL WITH CLOCK ENABLE AND TTL-COMPATIBLE INPUTS	
54FCT377	5962-8762701
54FCT377A	5962-8762702
FLIP-FLOP D-TYPE OCTAL WITH CLOCK ENABLE TTL-COMPATIBLE INPUTS	
54ACT377	5962-8769701
FLIP-FLOP D-TYPE OCTAL WITH DATA ENABLE AND TTL-COMPATIBLE INPUTS	
54HCT377	5962-8976901
FLIP-FLOP D-TYPE OCTAL WITH ENABLE	
54HC377	5962-8780701
54HC377	/65603
FLIP-FLOP D-TYPE OCTAL WITH INVERTED THREE-STATE OUTPUTS	
54HC534	5962-8681401
54ALS576A	5962-8400102
54HC534	/65605
54ALS576A	/37105
FLIP-FLOP D-TYPE OCTAL WITH INVERTING THREE-STATE OUTPUTS	
54AC534	/75605
54AC564	/75606
FLIP-FLOP D-TYPE OCTAL WITH NONINVERTING THREE-STATE OUTPUTS	
54HCT374	5962-8550701
54HCT374	/65652
FLIP-FLOP D-TYPE OCTAL WITH NONINVERTING THREE-STATE OUTPUTS TTL-COMPATIBLE	
54FCT374	5962-8762801
54FCT374A	5962-8762802
FLIP-FLOP D-TYPE OCTAL WITH THREE-STATE OUTPUTS	
54ACT574	5962-8960101
54ALS534	5962-8866801
54FCT534	5962-8865501
54FCT574	5962-8951301
54AC374	5962-8769401
54F574	5962-8972401
54AC374	/75602
54HC374	5962-8407101
54HC374	/65602
54FCT534A	5962-8865502
54ACT564	5962-8955701
54FCT574	5962-8951302
54F574	/34110
54F564	/34111
54ALS574A	5962-8400101
54HC574	/65604
54ALS574A	/37104
54AC574	/75604
54F374	/34105
54F534	/34106
FLIP-FLOP D-TYPE OCTAL WITH THREE-STATE OUTPUTS TTL-COMPATIBLE INPUTS	
54ACT374	5962-8763101
54ACT534	5962-8965801
54ACT11534	5962-8965802
54ACT11374	5962-8763102
FLIP-FLOP D-TYPE OCTAL WITH TRANSPARENT LATCH AND THREE-STATE OUTPUTS	
54ALS373	5962-8302001
54ALS373	/37203
FLIP-FLOP D-TYPE QUAD	
54LS173A	/36101
54F379	/34109
54HC175	5962-8408901
54175	/01702
25LS175	/33107
54F175	/34104
54S174	/07105
54S175	/07106
54LS175	/30107
54HC175	/65308
FLIP-FLOP D-TYPE QUAD TTL-COMPATIBLE INPUTS	
54ACT175	5962-8969301
FLIP-FLOP D-TYPE QUAD TTL-COMPATIBLE INPUTS WITH THREE-STATE OUTPUTS	
54HCT173	5962-8875901
FLIP-FLOP D-TYPE QUAD WITH CLEAR	
54ALS175	5962-8301902
54ALS175	/37202
FLIP-FLOP D-TYPE QUAD WITH MASTER RESET	
54AC175	5962-8955201
54AC175	/75308
FLIP-FLOP D-TYPE QUAD WITH RESET TTL-COMPATIBLE INPUTS	
54ACT273	5962-8973501
54HCT175	5962-8970101
FLIP-FLOP D-TYPE QUAD WITH STANDARD AND THREE-STATE OUTPUTS	
2918	5962-8671501
2918	/44201
FLIP-FLOP D-TYPE QUAD WITH THREE-STATE OUTPUTS	
54HC173	5962-8682501
54HC173	/65306
FLIP-FLOP JK	
54L72	/02102
54H72	/02201
54H101	/02205
FLIP-FLOP JK MASTER SLAVE DUAL	
10H535	5962-8750501
FLIP-FLOP JK DUAL	
54HC109	5962-8415001
54LS73	/30101
5473	/00202
4027A	/05102
54F109	/34102
54S112	/07102
54107	/00203
54L73	/02103
54F112	/34103
54LS112	/30103
54L78	/02104
54HC109	/65304
5476	/00204
10535	/06104
4027B	/05152
9093	/03304
54H73	/02202
54LS107	/30108
54H76	/02204
54LS109	/30109
54H103	/02206
FLIP-FLOP JK DUAL NEGATIVE EDGE-TRIGGERED	
54LS76A	5962-7601301
54LS76A	/30110
FLIP-FLOP JK DUAL NEGATIVE EDGE-TRIGGERED WITH ASYNCHRONOUS PRESET	
54HC113	5962-8969501
FLIP-FLOP JK DUAL NEGATIVE EDGE-TRIGGERED WITH CLEAR AND SET	
54AC112	/75305
FLIP-FLOP JK DUAL NEGATIVE-EDGE TRIGGERED WITH RESET	
54HCT107	5962-9084901
FLIP-FLOP JK DUAL POSITIVE EDGE-TRIGGERED WITH CLEAR AND SET	
54AC109	5962-8955101
54AC109	/75304
FLIP-FLOP JK DUAL POSITIVE EDGE-TRIGGERED WITH TTL-COMPATIBLE INPUTS	
54ACT109	5962-8853401
54ACT11109	5962-8853402
FLIP-FLOP JK DUAL WITH CLEAR AND PRESET (ACTIVE HIGH)	
54ALS109A	5962-8400001
54ALS109A	/37102
FLIP-FLOP JK DUAL WITH CLEAR AND PRESET (ACTIVE LOW)	
54ALS112A	5962-8400002
54ALS112A	/37103
FLIP-FLOP JK DUAL WITH PRESET	
54S114	/07104
54LS114	/30105
FLIP-FLOP JK DUAL WITH PRESET AND CLEAR	
54HC76	5962-8773201
54S113	/07103
54LS113	/30104
FLIP-FLOP JK DUAL WITH RESET	
54HC73	/65301
54HC73	5962-8515301
54HC107	5962-8515401
54HC107	/65303
FLIP-FLOP JK DUAL WITH SET AND RESET	
54HC112	5962-8408801
54HC112	/65305
FLIP-FLOP JK DUAL WITH SET AND RESET TTL-COMPATIBLE INPUTS	
54HCT109	5962-9070101
54HCT112	5962-8970201
FLIP-FLOP JK GATED	
4095B	/17502
4096B	/17503
FLIP-FLOP JK SINGLE	
5472	/00201
5470	/00206
FLIP-FLOP RS	
54L71	/02101
FLIP-FLOP RS/JK	

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MILITARY PARTS SORTED BY FUNCTION

Industry P/N	Military* PN
945	/03301
948	/03302
FLIP-FLOP TYPE D 8-BIT TTL-COMPATIBLE INPUTS POSITIVE EDGE-TRIGGERED	
54ACT825	5962-9161101
FLIP-FLOPS 10-BIT BUS INTERFACE WITH 3-STATE OUTPUTS	
54ALS29821	5962-9061601
LATCH 4-BIT	
5477	/01502
LATCH 4-BIT BISTABLE	
5475	/01501
54LS75	5962-7601201
54LS75	/31601
54LS375	/31604
LATCH 4-BIT WITH MASTER RESET	
93L14	/04501
9314	/01504
LATCH 4-BIT/DECODER 4-TO-16-LINE	
4514B	/17301
4514B	5962-7703501
LATCH 8-BIT ADDRESSABLE	
9334	/16001
54ALS259	5962-8874101
54HC259	5962-8551901
54F259	5962-8972301
54LS259	/31603
4099B	/17601
54LS259B	/31605
54HC259	/65402
LATCH BUS INTERFACE 10-BIT NONINVERTING WITH 3-STATE OUTPUTS TTL-COMPATIBLE	
54FCT841A	5962-8857501
54FCT841B	5962-8857502
LATCH D-TYPE TRANSPARENT DUAL 4-BIT WITH INVERTED THREE-STATE OUTPUTS	
54ALS880	5962-8403202
54ALS880	/38204
LATCH D-TYPE TRANSPARENT DUAL 4-BIT WITH THREE-STATE OUTPUTS	
54ALS873	5962-8403201
54ALS873	/38203
LATCH D-TYPE TRANSPARENT OCTAL W/NONINVERTING 3-STATE OUTPUTS TTL-COMPATIBLE	
54FCT373	5962-8764401
54FCT373A	5962-8764402
LATCH D-TYPE TRANSPARENT OCTAL WITH 3-STATE OUTPUTS AND TTL-COMPATIBLE INPUTS	
54ACT373	5962-8755601
54ACT11373	5962-8755602
LATCH D-TYPE TRANSPARENT OCTAL WITH INVERTED THREE-STATE OUTPUTS	
8283	5962-8417902
54ALS580	/38202
8283	5962-8417904
54ALS580	5962-8401202
LATCH D-TYPE TRANSPARENT OCTAL WITH THREE STATE OUTPUTS	
8282	5962-8417903
LATCH D-TYPE TRANSPARENT OCTAL WITH THREE-STATE OUTPUTS	
54AC373	5962-8755501
54ALS573	/38201
54ALS563A	5962-8870001
8282	5962-8417901
54HC563	5962-8606201
54AC11373	5962-8755502
54AC373	/75403
54ALS573	5962-8401201
54HC563	/65405
LATCH D-TYPE TRANSPARENT OCTAL WITH TTL-COMPATIBLE INPUTS AND 3-STATE OUTPUTS	
54HCT373	5962-8686701
54HCT373	/65453
LATCH D-TYPE 4-BIT	
4042B	5962-8101901
LATCH D-TYPE 8-BIT EDGE-TRIGGERED READ BACK	
54ALS996	5962-8994501
LATCH D-TYPE 8-BIT WITH INVERTED THREE-STATE OUTPUTS	
54HC533	5962-8681301
54HC533	/65404
LATCH D-TYPE 8-BIT WITH THREE-STATE OUTPUTS	
54F373	/34601
54HC573	5962-8512801
54F533	/34602
54LS373	/32502
54F563	/34603
54HC373	5962-8407201
54F573	/34604
54HC373	/65403
54HC573	/65406
LATCH D-TYPE 8-BIT WITH THREE-STATE OUTPUTS AND LSTTL-COMPATIBLE INPUTS	
54HCT573	5962-8685601
LATCH D-TYPE 8-BIT WITH THREE-STATE OUTPUTS TTL-COMPATIBLE INPUTS	
54ACT563	5962-8955601
54ACT573	5962-8766401
LATCH D-TYPE OCTAL WITH THREE-STATE OUTPUTS	
54BCT373	5962-9074601
LATCH DUAL 4-BIT	
93L08	/04502
54116	/01503
4508B	/17602
LATCH MULTI-MODE BUFFERED INV. (THREE-STATE)	
54F432	5962-9058501
LATCH OCTAL D-TYPE WITH INVERTED THREE-STATE OUTPUTS	
54AC563	/75405
LATCH OCTAL D-TYPE WITH THREE-STATE OUTPUTS	
54AC573	/75406
LATCH OCTAL TRANPARENT	
54FCT533	5962-8865101
54FCT533A	5962-8865102
LATCH OCTAL TRANSPARENT WITH INVERTED THREE-STATE OUTPUTS	
54AC533	/75404
LATCH OCTAL TRANSPARENT WITH THREE-STATE OUTPUTS TTL-COMPATIBLE	
54FCT573	5962-8863901
54FCT573A	5962-8863902
LATCH RS 4-BIT	
54LS279	5962-7601801
54LS279	/31602
LATCH RS 4-BIT WITH THREE-STATE OUTPUTS	
4044B	5962-7702601
4043A	/05103
4043B	/05153
LATCH TRANSPARAENT DUAL 2-BIT BISTABLE TTL-COMPATIBLE INPUTS	
54HCT75	5962-9075801
LATCH TRANSPARENT DUAL 2-BIT	
54HC75	5962-8407001
54HC75	/65401
MULTIVIBRATOR DUAL MONOSTABLE	
54221	5962-8771101
MULTIVIBRATOR DUAL MONOSTABLE RETRIGGERABLE	
54123	/01203
MULTIVIBRATOR DUAL MONOSTABLE RETRIGGERABLE WITH CLEAR	
54LS123	5962-7603901
54LS123	/31401
MULTIVIBRATOR DUAL MONOSTABLE WITH SCHMITT-TRIGGER INPUTS AND CLEAR	
54LS221	5962-7604201
54LS221	/31402
MULTIVIBRATOR DUAL NON-RETRIGGERABLE MONOSTABLE WITH RESET	
54HC221	5962-8780501
54HC221A	5962-8780502
MULTIVIBRATOR DUAL ONE-SHOT	
9602	/01205
MULTIVIBRATOR DUAL RETRIGGERABLE MONOSTABLE	
54HC423A	5962-8949201
54HC123	5962-8684701
54HC123A	5962-8684702
MULTIVIBRATOR DUAL RETRIGGERABLE MONOSTABLE WITH RESETS TTL-COMPATIBLE INPUTS	
54HCT123	5962-8970001
MULTIVIBRATOR DUAL RETRIGGERABLE PRECISION MONOSTABLE	
54HC4538	5962-8688601
MULTIVIBRATOR DUAL RETRIGGERABLE RESETTABLE MONOSTABLE	
26S02	5962-8766201
MULTIVIBRATOR DUAL RETRIGGERABLE/RESETTABLE MONOSTABLE	
4528B	5962-7704501
4098B	5962-7705501
4528B	5962-7704502
4098B	/17504
MULTIVIBRATOR MONOSTABLE	
54L121	/04201
951	/03201
10598	5962-8777301
54121	/01201
MULTIVIBRATOR MONOSTABLE RETRIGGERABLE	
54122	/01202
MULTIVIBRATOR MONOSTABLE RETRIGGERABLE WITH CLEAR	
54LS122	5962-7600301
54LS122	/31403
MULTIVIBRATOR MONOSTABLE RETRIGGERABLE W/CLEAR	
54L122	/04202
MULTIVIBRATOR MONOSTABLE/ASTABLE	
4047B	5962-8102001
4047B	5962-8102002
MULTIVIBRATOR ONE-SHOT	
9601	/01204

Combinatorial gates /4

Industry P/N	Military* PN
ADDER 2-BIT	
5482	/00601
ADDER 4-BIT	
5483	/00602
ADDER 4-BIT BINARY FULL WITH FAST CARRY	
54HC283	5962-8976501
ADDER 4-BIT FULL	
4008A	/05401
54F283	/34201
4008B	/05451
ADDER 4-BIT FULL WITH FAST CARRY	
54LS83A	5962-7601401
54LS83A	/31201
54LS283	5962-7604301
54LS283	/31202
ADDER DUAL	
9304	/00603
ADDER FULL	
5480	/00604
ALU/FUNCTION GENERATOR 4-BIT	
54F181	/33801
54S181	/07801
54LS181	/30801
54F382	/33804
54181	/01101
ARITHMETIC LOGIC UNIT 16-BIT CASCADABLE	
L4C381-45	5962-8995901
ARITHMETIC LOGIC UNIT 4-BIT	
54F381	5962-8671001
54F381	/33803
ARITHMETIC LOGIC	

*Part numbers beginning with a slash "/" are MIL-M-38510 numbers. All others are DESC drawing numbers.

MILITARY PARTS SORTED BY FUNCTION

Industry P/N	Military* PN
UNIT/FUNCTION GENERATOR	
54LS382	5962-8688101
BI-QUINARY COUNTER	
10538	5962-9093501
BUS INTERFACE LATCH D-TYPE 9-BIT WITH THREE-STATE OUTPUTS	
54ALS29843	5962-9072001
COMPARATOR 5-BIT	
93L24	/04401
CONVERTER BINARY-TO-BCD 6-BIT	
54185A	5962-7703001
CONVERTER HEX LOGIC LEVEL DOWN	
54HC4050	5962-8682001
DATA GENERATOR/MULTIPLEXER 1-OF-16 WITH THREE-STATE OUTPUTS	
54AS250A	5962-9056201
DATA SEL/MULTIPLEXER 16-INPUT	
54150	/01401
DATA SEL/MULTIPLEXER 4-TO-1-LINE	
93L09	/04601
DATA SEL/MULTIPLEXER 8-INPUT	
54LS151	5962-7601001
54ALS151	5962-8414101
54AC151	5962-8769101
9312	/01402
54AC151	/76201
54S151	/07901
54151	/01406
54LS151	/30901
54F151A	/33901
DATA SEL/MULTIPLEXER 8-INPUT THREE-STATE TTL-COMPATIBLE INPUTS	
54HCT251	5962-9052401
DATA SEL/MULTIPLEXER 8-INPUT TTL-COMPATIBLE INPUTS	
54HCT151	5962-9065201
DATA SEL/MULTIPLEXER 8-INPUT WITH ENABLE	
54HC151B	5962-8412801
93L12	/04602
54HC151B	/66201
DATA SEL/MULTIPLEXER 8-INPUT WITH THREE-STATE OUTPUTS	
54LS251	5962-7601601
54S251	5962-8002201
54HC251B	5962-8512501
54ALS251	5962-8413501
54AC251	5962-8769201
54AC251	/76205
54S251	/07905
54LS251	/30905
54F251A	/33905
54HC251B	/66205
DATA SEL/MULTIPLEXER 8-INPUT WITH THREE-STATE OUTPUTS TTL-COMPATIBLE INPUTS	
54ACT251	5962-8959901
DATA SEL/MULTIPLEXER DUAL 4-INPUT	
54AC153	5962-8762501
54ALS153	5962-8413401
54LS153	5962-7601101
54HC153B	5962-8409301
54153	/01403
54AC153	/76202
9309	/01404
54S153	/07902
54LS153	/30902
54F153	/33902
54HC153B	/66202
54F352	/33909
DATA SEL/MULTIPLEXER DUAL 4-INPUT TTL-COMPATIBLE INPUTS	
54ACT153	5962-8769801
54HCT153	5962-9050501
DATA SEL/MULTIPLEXER DUAL 4-INPUT WITH THREE-STATE OUTPUTS	
54ALS253	5962-8509601
54LS353	5962-8550801
54LS253	5962-7601701
54AC253	5962-8769301
54AC253	/76206
54S253	/07908
54LS253	/30908
54F253	/33908
54F353	/33910
DATA SEL/MULTIPLEXER DUAL 4-INPUT WITH THREE-STATE OUTPUTS TTL-COMP. INPUTS	
54ACT11353	5962-9090601
DATA SEL/MULTIPLEXER DUAL 4-INPUT WITH THREE-STATE OUTPUTS TTL-COMPATIBLE	
54ACT253	5962-8776101
DATA SEL/MULTIPLEXER DUAL 4-LINE TO 1-LINE WITH THREE-STATE OUTPUTS	
54HC253B	5962-8868201
54HC253B	/66206
DATA SEL/MULTIPLEXER DUAL 4-TO-1	
10H574	5962-8750601
DATA SEL/MULTIPLEXER HEX 2-INPUT WITH THREE-STATE OUTPUTS	
54ALS857	5962-8753301
54ALS857A	/37901
DATA SEL/MULTIPLEXER QUAD 2-INPUT	
54LS157	5962-7600201
54HC157B	5962-8606101
54ALS157	5962-8686901
54ALS158	5962-8862501
54ACT158	5962-8875501
54AC157	5962-8953901
54AC158	5962-8972901
54AC157	/76203
54157	/01405
54AC158	/76204
54S157	/07903
54LS157	/30903
54S158	/07904
54F157A	/33903
54HC157B	/66203
54F158A	/33904
DATA SEL/MULTIPLEXER QUAD 2-INPUT NONINVERTING	
10H558	5962-8756601
DATA SEL/MULTIPLEXER QUAD 2-INPUT INVERTING TTL-COMPATIBLE INPUTS	
54HCT158	5962-9070301
DATA SEL/MULTIPLEXER QUAD 2-INPUT NONINVERTING TTL-COMPATIBLE INPUTS	
54HCT157	5962-9070201
DATA SEL/MULTIPLEXER QUAD 2-INPUT TTL-COMPATIBLE INPUTS	
54ACT157	5962-8968801
DATA SEL/MULTIPLEXER QUAD 2-INPUT WITH 3-STATE INVERTING OUTPUTS TTL-COMPATIB	
54HCT258	5962-8970801
DATA SEL/MULTIPLEXER QUAD 2-INPUT WITH 3-STATE OUTPUTS TTL-COMPATIBLE INPUTS	
54ACT257	5962-8968901
DATA SEL/MULTIPLEXER QUAD 2-INPUT WITH ENABLE	
54LS158	5962-7603301
54L157	/04603
54LS158	/30904
DATA SEL/MULTIPLEXER QUAD 2-INPUT WITH ENABLE AND THREE-STATE OUTPUTS	
54LS257B	5962-7603701
54LS257B	/30906
DATA SEL/MULTIPLEXER QUAD 2-INPUT WITH INVERTED OUTPUTS	
54HC158B	5962-8682301
54HC158B	/66204
DATA SEL/MULTIPLEXER QUAD 2-INPUT WITH STORAGE	
54LS298	5962-7601901
54LS298	/30909
DATA SEL/MULTIPLEXER QUAD 2-INPUT WITH THREE-STATE INVERTED OUTPUTS	
54S258	5962-8002301
54S258	/07907
DATA SEL/MULTIPLEXER QUAD 2-INPUT WITH THREE-STATE NONINVERTING OUTPUTS	
54HCT257	5962-8970501
DATA SEL/MULTIPLEXER QUAD 2-INPUT WITH THREE-STATE OUTPUTS	
40257B	/17803
54HC257	5962-8512401
54AC257	5962-8870301
54ALS257	5962-8509701
54ACT258	5962-8870401
54ALS258	5962-8862601
54AC257	/76207
54S257	/07906
54F257A	/33906
54HC257	/66207
54F258A	/33907
DATA SEL/MULTIPLEXER QUAD 2-INPUT WITH THREE-STATE OUTPUTS WITH ENABLE	
54LS258B	5962-7603801
54LS258B	/30907
DECODER 1-TO-4-LINE	
9321	/15801
DECODER 3-LINE-TO-8-LINE	
54LS138	/30701
54HCT138	5962-8550401
54HC138	5962-8406201
54LS138	5962-7600501
54HC138	/65802
54HCT138	/65852
DECODER 3-LINE-TO-8-LINE TTL-COMPATIBLE	
54FCT138	5962-8765401
54FCT138A	5962-8765402
DECODER 3-TO-8-LINE	
54F138	/33701
DECODER 3-TO-8-LINE WITH ADDRESS LATCHES	
54ALS137	5962-9066501
DECODER 4-TO-10-LINE	
8251	/15205
8252	/15206
DECODER 4-TO-16-LINE	
54154	/15201
54HCT154	5962-8670101
54HC154	5962-8682201
54HC154	/65804
DECODER 4-TO-16-LINE WITH LATCHED INPUTS	
4515B	5962-7703201
4515B	/17302
DECODER BCD-TO-7-SEGMENT	
9317	/15802
5448	/01008
DECODER BCD-TO-7-SEGMENT WITH OPEN-COLLECTOR OUTPUTS	
54LS47	5962-7604501
54LS47	/30704
5446	/01006
5447	/01007
5449	/01009
DECODER BCD-TO-DECIMAL	
54LS42	5962-7603101
5442	/01001
54L42	/02901
54HC42	/65801
4028A	/05901
4028B	/05951
54HC42	5962-8682101
54LS42	/30703
5445	/01004
76L42A	/02906
93L01	/02907
DECODER BCD-TO-DECIMAL WITH OPEN-COLLECTOR OUTPUTS	
54145	/01005
DECODER BINARY TO 1-4	
10H571	5962-8756801
DECODER BINARY TO 1-OF-8	
10H561	5962-8756701
DECODER BINARY-TO-OCTAL	
8250	/15204
DECODER DUAL 1-OF-4	
54FCT139	5962-8950801
54FCT139A	5962-8950802
DECODER DUAL 2-LINE-TO-4-LINE	
54LS155	/32601
54LS139	5962-7600701
54ALS139	5962-8768301
54HC139	5962-8409201
54155	/15202
54F139	/33702
54LS139	/30702
54AC139	5962-8762301
54AC139	/75803
54156	/15203
54HC139	/65803
54HCT139	/65853
DECODER DUAL 2-LINE-TO-4-LINE WITH OPEN-COLLECTOR OUTPUTS	
54LS156	/32602

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MILITARY PARTS SORTED BY FUNCTION

Industry P/N	Military* PN
DECODER EXCESS-3-GRAY-TO-DECIMAL	
5444	/01003
54L44	/02903
DECODER EXCESS-3-TO-DECIMAL	
54L43	/02902
5443	/01002
DECODER N-BIT 1-OF-8	
1853	5962-7901901
1853	/47401
DECODER/DEMULTIPLEXER 3-LINE-TO-8-LINE	
54AC138	5962-8762201
54S138	/07701
54ALS138	/37701
54HC238	5962-8688401
54ALS138	5962-8686601
54AC138	/75802
54S138	5962-7604101
54ACT138	5962-8755401
DECODER/DEMULTIPLEXER 3-LINE-TO-8-LINE TTL-COMPATIBLE INPUTS	
54HCT238	5962-8974501
DECODER/DEMULTIPLEXER 3-LINE-TO-8-LINE W/ ADDRESS LATCHES TTL-COMPATIBLE	
54HCT237	5962-9061301
DECODER/DEMULTIPLEXER 3-LINE-TO-8-LINE WITH ADDRESS LATCH	
54HC237	5962-8860601
DECODER/DEMULTIPLEXER 4-LINE-TO-16-LINE	
54LS154	5962-8301701
DECODER/DEMULTIPLEXER 8-INPUT TTL-COMPATIBLE	
54ACT151	5962-8875601
DECODER/DEMULTIPLEXER DUAL 1-TO-4-LINE	
4555B	5962-7704701
4556B	5962-7704801
4555B	/17304
4556B	/17305
DECODER/DEMULTIPLEXER DUAL 2-TO-4-LINE	
54S139	5962-7700401
54ACT139	5962-8755301
54S139	/07702
DECODER/DRIVER BCD-TO-7-SEGMENT	
54HC4511	5962-8773301
DECODER/DRIVER BCD-TO-DECIMAL	
54LS145	5962-8508401
DECODER/DRIVER BCD-TO-SEVEN-SEGMENT	
54LS248	5962-8994401
DISPLAY DECODER BCD-TO-7-SEGMENT	
54L46	/02904
54L47	/02905
DIVIDER FIXED MODULUS 500 MHZ ^ 2	
SP8602	5962-9205901
FULL ADDER DUAL CARRY-SAVE	
54LS183	5962-9054101
HEX TRANSLATOR TTL-TO-ECL	
100324	5962-9153001
IDENTITY COMPARATOR 8-BIT	
54ALS688	5962-8857801
25LS2521	5962-8671301
54F521	/34701
54ALS520	5962-8869101
54F520	5962-8871201
IDENTITY COMPARATOR 8-BIT TTL-COMPATIBLE INPUTS	
54ACT520	5962-8979301
54FCT521	5962-8854301
54FCT521A	5962-8854302
54ACT521	5962-8979302
54FCT521B	5962-8854303
54ACT11520	5962-8979303
54ACT11521	5962-8979304
IDENTITY COMPARATOR 8-BIT WITH OPEN-COLLECTOR OUTPUTS	
54F518	5962-8871001
54F519	5962-8871101
KEYBOARD ENCODER 16-KEY WITH THREE-STATE OUTPUTS	
54C922	5962-8752101
LATCH 9-BIT BUFFERED NON-INVERTING W/THREE-STATE OUTPUT TTL COMPATIBLE	
54FCT843A	5962-8975801
54FCT843B	5962-8975802
54FCT843C	5962-8975803
LATCH D-TYPE 10-BIT BUS INTERFACE WITH THREE-STATE OUTPUTS	
54ALS29842	5962-9071001
LOOK AHEAD CARRY GENERATOR	
54F182	/33802
54S182	/07802
54182	/01102
LOOKAHEAD CARRY GENERATOR HIGH-SPEED	
54FCT182	5962-8865201
54FCT182A	5962-8865202
MAGNITUDE COMPARATOR 4-BIT	
54HC85	5962-8601301
54C85	5962-7703701
54S85	/08201
54F85	5962-8606901
54LS85	/31101
54HCT85	5962-8867201
5485	/15001
4585B	5962-7703702
MAGNITUDE COMPARATOR 5-BIT	
9324	/15002
MAGNITUDE COMPARATOR 8-BIT	
54AS885	5962-8975701
54HC688	5962-8681801
MAGNITUDE COMPARATOR 8-BIT WITH ENABLE	
54AC521	5962-9098501
54AC11521	5962-9098502
MAGNITUDE COMPARATOR 8-BIT WITH LSTTL-COMPATIBLE INPUTS	
54HCT688	5962-8685701
MANCHESTER ENCODER/DECODER	
15530	5962-7802901
MANCHESTER ENCODER/DECODER 1.25 MEGABIT/S	
HD1-15531	5962-9054901
MANCHESTER ENCODER/DECODER 2.50 MEGABIT/S	
HD1-15531B	5962-9054902
MULTIPLEXER 8-INPUT	
10H564	5962-8772901
10564	5962-8852701
MULTIPLEXER DUAL 8-INPUT	
100363	5962-9165501
MULTIPLEXER QUAD 2-INPUT NONINVERTING	
10558	5962-8779201
MULTIPLEXER QUAD 2-INPUT THREE-STATE OUTPUTS	
54AC258	5962-9160401
MULTIPLEXER QUAD 2-INPUT W/STORAGE	
54F398	/35001
54F399	/35002
MULTIPLEXER/LATCH QUAD 2-INPUT	
100355	5962-9165401
MULTIPLIER 16-BIT PARALLEL 30 NS MULTIPLY TIME	
(SEE DWG)	5962-8873304
MULTIPLIER 16-BIT PARALLEL 40 NS MULTIPLY TIME	
(SEE DWG)	5962-8873305
MULTIPLIER 16-BIT PARALLEL 42 NS MULTIPLY TIME	
7216L-40	5962-8687301
7217L-40	5962-8768601
MULTIPLIER 16-BIT PARALLEL 55 NS MULTIPLY TIME	
1010	5962-8873301
7216L-55	5962-8687302
7217L-55	5962-8768602
MULTIPLIER 16-BIT PARALLEL 65 NS MULTIPLY TIME	
1010	5962-8873302
MULTIPLIER 16-BIT PARALLEL 75 NS ACCESS TIME	
7217L-75	5962-8768603
MULTIPLIER 16-BIT PARALLEL 75 NS MULTIPLY TIME	
7216L-75	5962-8687303
(SEE DWG)	5962-8873303
MULTIPLIER 8 X 8 TWO'S COMPLEMENT 45 NS MULTIPLY TIME	
LMU0845	5962-8873906
MULTIPLIER 8 X 8 TWO'S COMPLEMENT 50 NS MULTIPLY TIME	
TMC208KV1	5962-8873902
MULTIPLIER 8 X 8 TWO'S COMPLEMENT 60 NS MULTIPLY TIME	
LMU0860	5962-8873905
MULTIPLIER 8 X 8 TWO'S COMPLEMENT 70 NS MULTIPLY TIME	
TMC208KV	5962-8873901
MULTIPLIER 8 X 8 UNSIGNED MAGNITUDE 45 NS MULTIPLY TIME	
LMU8U45	5962-8873908
MULTIPLIER 8 X 8 UNSIGNED MAGNITUDE 50 NS MULTIPLY TIME	
TMC28KUV1	5962-8873904
MULTIPLIER 8 X 8 UNSIGNED MAGNITUDE 60 NS MULTIPLY TIME	
LMU8U60	5962-8873907
MULTIPLIER 8 X 8 UNSIGNED MAGNITUDE 70 NS MULTIPLY TIME	
TMC28KUV	5962-8873903
MULTIPLIER BINARY 2-BIT-BY-4-BIT	
54LS261	/31801
54LS261	5962-8002601
MULTIPLIER/ACCUMULATOR 12 X 12 BIT 170 NS MULTIPLY TIME	
TMC2009	5962-9099601
MULTIPLIER/ACCUMULATOR 12 X 12 BIT 55 NS MULTIPLY TIME	
LMA1009/2009	5962-9099604
MULTIPLIER/ACCUMULATOR 12 X 12 BIT 65 NS MULTIPLY	
LMA1009/2009	5962-9099603
MULTIPLIER/ACCUMULATOR 12 X 12 BIT 95 NS MULTIPLY TIME	
LMA1009/2009	5962-9099602
MULTIPLIER/ACCUMULATOR 8 X 8	
TMC2208J4V	5962-9070801
MULTIVIBRATOR DUAL PRECISION RETRIGGERABLE/RESETTABLE MONOSTABLE	
14538B	5962-9055701
14538B	5962-9055702
PARITY GENERATOR/CHECKER 12-BIT	
93S48	5962-8672601
10H560	5962-8756201
PARITY GENERATOR/CHECKER 8-BIT	
54180	/01901
PARITY GENERATOR/CHECKER 9-BIT	
54F280	/34901
54LS280	/32901
82S62	5962-8754301
PARITY GENERATOR/CHECKER 9-BIT ODD/EVEN	
54HC280	5962-8607701
PARITY GENERATOR/CHECKER 9-BIT WITH BUS DRIVER PARITY I/O PORT	

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Industry P/N	Military* PN
54AS286	5962-8966301
ARITY GENERATOR/CHECKER DUAL 8-BIT HIGH-SPEED TTL-COMPATIBLE INPUTS	
54FCT480	5962-9079801
54FCT480A	5962-9079802
54FCT480B	5962-9079803
OLYNOMIAL GENERATOR/CHECKER SERIAL DATA	
54F402	5962-9059301
PRESCALER TWO-MODULUS ECL-TO-TLL TRANSLATOR	
12511	5962-8774301
PRESCALER TWO-MODULUS ECL-TO-TTL TRANSLATOR	
12509	5962-8774801
PRESCALER TWO-MODULUS ECL-TO-TTL TRANSLATOR WITH DIVIDE BY 10 AND 11	
12513	5962-8774901
PRIORITY ENCODER 10-TO-4-LINE	
54147	/15601
54HC147	5962-8406401
PRIORITY ENCODER 8-INPUT	
93L18	/04301
4532B	/17303
9318	/15603
PRIORITY ENCODER 8-LINE-TO-3-LINE	
54LS148	5962-7802701
54LS148	/36001
25LS2513	5962-8754201
54F148	5962-8607001
54148	/15602
PRIORITY ENCODER 8-LINE-TO-3-LINE TS	
54LS348	/36002

Sequential registers/counters 5/

Industry P/N	Military* PN
BCD COUNTER 4-BIT SYNCHRONOUS WITH MODE CONTROL	
54LS190	5962-7603501
54LS190	/31513
BCD COUNTER 4-BIT SYNCHRONOUS WITH SYNCHRONOUS RESET	
54HC162	5962-8409401
54HC162	/66303
BCD COUNTER 8-BIT SYNCHRONOUS DOWN TTL-COMPATIBLE INPUTS	
54HCT40102	5962-9057401
BCD DECADE COUNTER 4-BIT SYNCHRONOUS RESET TTL-COMPATIBLE INPUTS	
54HCT162	5962-8970701
BCD DECADE COUNTER ASYNCHRONOUS RESET TTL-COMPATIBLE INPUTS	
54HCT160	5962-9070501
BINARY COUNTER 12-BIT	
4040B	5962-7705801
BINARY COUNTER 12-STAGE RIPPLE	
54HC4040	5962-8500401
54HC4040	/66313
BINARY COUNTER 12-STAGE RIPPLE-CARRY TTL-COMPATIBLE INPUTS	
54HCT4040	5962-8994701
BINARY COUNTER 14-STAGE	
54HC4060	5962-8768001
4020A	/05603
4020B	/05653
BINARY COUNTER 14-STAGE RIPPLE	
54HC4020	5962-8500301
54HC4020	/66311
BINARY COUNTER 14-STAGE RIPPLE TTL COMPATIBLE INPUTS	
54HCT4020	5962-8945801
BINARY COUNTER 14-STAGE WITH OSCILLATOR AND TTL COMPATIBLE INPUTS	
54HCT4060	5962-8977101
BINARY COUNTER 4-BIT	
93S16	5962-8672701
10H416	5962-8759001
5493	/01302
54L93	/02502
54LS293	/32004
BINARY COUNTER 4-BIT SYNCHRONOUS	
54LS161	5962-7600801
54F161A	/34301
54F163A	/34302
54163A	/01304
54LS161	/31504
93L16	/02505
54161	/01306
BINARY COUNTER 4-BIT SYNCHRONOUS PRESETTABLE	
54AC161	/76302
54AC161	5962-8956101
54AC163	5962-8958201
54AC163	/76304
54FCT163A	5962-8865702
54FCT163	5962-8865703
54FCT163A	5962-8865704
BINARY COUNTER 4-BIT SYNCHRONOUS PRESETTABLE TTL-COMPATIBLE	
54FCT163	5962-8865701
BINARY COUNTER 4-BIT SYNCHRONOUS UP/DOWN	
54AC169	5962-9160301
54ALS191	5962-8684001
54FCT193	5962-9066901
54ALS169B	5962-8302501
54LS193	5962-7600601
54ALS193	5962-8869801
54F169	5962-8607201
54FCT193A	5962-9066902
54F191	/34303
54LS169	5962-8001802
54ALS169B	/38003
54F193	/34304
54LS169	/31506
54LS193	/31508
54193	/01309
BINARY COUNTER 4-BIT SYNCHRONOUS UP/DOWN WITH PRESET AND RIPPLE CLOCK	
54FCT191	5962-8973303
BINARY COUNTER 4-BIT SYNCHRONOUS UP/DOWN PRESETTABLE TTL-COMPATIBLE INPUTS	
54HCT191	5962-8867101
BINARY COUNTER 4-BIT SYNCHRONOUS UP/DOWN WITH ASYNCHRONOUS RESET	
54HC193	5962-8772401
54HC193	/66307
BINARY COUNTER 4-BIT SYNCHRONOUS UP/DOWN WITH DOWN/UP MODE CONTROL	
54LS191	5962-7600901
54LS191	/31509
BINARY COUNTER 4-BIT SYNCHRONOUS UP/DOWN WITH PRESET	
54HC191	5962-8689101
54HC191	/66305
BINARY COUNTER 4-BIT SYNCHRONOUS UP/DOWN WITH PRESET AND RIPPLE CLOCK	
54FCT191	5962-8973301
54FCT191A	5962-8973302
54FCT191A	5962-8973304
BINARY COUNTER 4-BIT SYNCHRONOUS UP/DOWN WITH THREE-STATE OUTPUTS	
25LS2569	5962-8754401
54ALS569A	5962-8302502
54ALS569A	/38005
BINARY COUNTER 4-BIT SYNCHRONOUS PRESETTABLE TTL-COMPATIBLE	
54FCT161	5962-8864001
54FCT161	5962-8864002
BINARY COUNTER 4-BIT SYNCHRONOUS WITH ASYNC. CLEAR AND LSTTL-COMPATIBLE INPUTS	
54HCT161	5962-8685401
BINARY COUNTER 4-BIT SYNCHRONOUS WITH ASYNCHRONOUS CLEAR	
54ALS161B	/38001
54HC161	5962-8407501
54HC161	/66302
54ALS161	5962-8302201
BINARY COUNTER 4-BIT SYNCHRONOUS WITH SYNCHRONOUS CLEAR	
54LS163A	5962-7603401
54ALS163B	/38002
54HC163	/66304
54ALS163	5962-8302202
54HC163	5962-8607601
54LS163A	/31512
BINARY COUNTER 4-BIT SYNCHRONOUS WITH THREE-STATE OUTPUTS	
54ALS561A	/38004
54ALS561A	5962-8302203
BINARY COUNTER 4-BIT PRESETTABLE SYNCHRONOUS ASYNCHRONOUS RESET TTL-COMPT.	
54HCT193	5962-9084801
BINARY COUNTER 7-STAGE	
4024A	/05605
4024B	/05655
BINARY COUNTER 7-STAGE RIPPLE	
54HC4024	5962-8601201
54HC4024	/66312
BINARY COUNTER 8-BIT BIDIRECTIONAL	
54F269	5962-8862701
BINARY COUNTER 8-BIT BIDIRECTIONAL WITH THREE-STATE OUTPUTS	
54F579	5962-8954501
BINARY COUNTER 8-BIT SYNCHRONOUS	
54HC40103	5962-9055301
BINARY COUNTER 8-BIT SYNCHRONOUS UP/DOWN	
54AS869	5962-8952601
BINARY COUNTER 8-BIT SYNCHRONOUS UP/DOWN WITH ASYNCHRONOUS CLEAR	
54AS867	5962-8966801
BINARY COUNTER 8-BIT WITH INPUT REGISTERS	
54LS592	5962-8762101
BINARY COUNTER 8-BIT WITH THREE-STATE OUTPUT REGISTERS	
54LS590	5962-8751701
54HC590	5962-8960301
BINARY COUNTER DUAL 4-BIT	
54HC393	5962-8410001
54LS393	/32702
54HC393	/66309
BINARY COUNTER DUAL 4-STAGE TTL COMPATIBLE INPUTS	
54HCT393	5962-8989001
BINARY COUNTER DUAL UP/DOWN	
4520B	5962-7702301
BINARY COUNTER DUAL WITH DIVIDE BY 2 AND DIVIDE BY 5 SECTIONS	
54HC390	5962-8600901
54HC390	/66308
BINARY COUNTER UP/DOWN WITH PRESET AND RIPPLE CLOCK	
54AC191	5962-8974901
54AC191	/76305
BINARY COUNTER/DIVIDER AND OSCILLATOR 14-STAGE RIPPLE CARRY	
4060A	5962-7703101
BINARY/DECADE COUNTER 4-BIT PRESETTABLE UP/DOWN	
4029B	5962-8101601
BUS INTERFACE REGISTER 10-WIDE	
29821A	5962-8775501
29921A	5962-8775504
BUS INTERFACE REGISTER 8-BIT	
54ALS29825	5962-9069501
BUS INTERFACE REGISTER 8-BIT NONINVERTING TTL-COMPATIBLE	
54FCT825A	5962-8867401
54FCT825B	5962-8867402
BUS INTERFACE REGISTER 8-WIDE	
29825A	5962-8775503
29925A	5962-8775506
BUS INTERFACE REGISTER 9-WIDE	

*Part numbers beginning with a slash "/" are MIL-M-38510 numbers. All others are DESC drawing numbers.

MILITARY PARTS SORTED BY FUNCTION

Industry P/N	Military* PN
29823A	5962-8775502
29923A	5962-8775505
COUNTER 4-BIT SYNCHRONOUS UP/DOWN	
4029B	5962-8101602
54L193	/02503
COUNTER BCD SYNCHRONOUS	
93L10	/02504
COUNTER BINARY 4-BIT	
54L90	/02501
COUNTER DIVIDE BY 10 OR 11 LOW POWER	
SP8690A	5962-8767801
COUNTER DIVIDE BY 64 OR 65	
SP8718	5962-8861701
COUNTER DIVIDE BY 64 PRESCALER WITH TTL-COMPATIBLE OUTPUTS	
SP8755	5962-8868401
COUNTER DIVIDE-BY-12	
54LS92	/31510
COUNTER DIVIDE-BY-8	
4022A	/05604
4022B	/05654
COUNTER DIVIDE-BY-N	
4018A	/05602
4018B	/05652
COUNTER DIVIDE-BY-TWELVE	
5492	/01301
COUNTER PROGRAMMABLE DIVIDE-BY-N	
54HC4059	5962-8944501
COUNTER PROGRAMMABLE DIVIDE-BY-N WITH TTL-COMPATIBLE INPUTS	
54HCT4059	5962-8862401
DECADE COUNTER	
4017A	/05601
4017B	/05651
DECADE COUNTER 4-BIT	
54LS93	5962-7700101
54LS90	/31501
54LS90	5962-7603201
54LS93	/31502
54LS290	/32003
5490	/01307
DECADE COUNTER 4-BIT SYNCHRONOUS	
54LS160A	5962-7700901
54LS160A	/31503
54162	/01305
54F162A	/34402
54ALS560	/38104
54ALS568	/38105
54LS162A	/31511
DECADE COUNTER 4-BIT SYNCHRONOUS BCD	
54160	/01303
54F160A	/34401
54ALS160	/38101
DECADE COUNTER 4-BIT SYNCHRONOUS UP/DOWN	
54HC190	5962-8994601
54LS668	5962-8687601
54LS168	5962-8001801
54LS168	/31505
54F190	/34403
54F192	/34404
54ALS168	/38103
54192	/01308
DECADE COUNTER 4-BIT SYNCHRONOUS UP/DOWN WITH ASYNCHRONOUS RESET	
54HC192	5962-8780801
54HC192	/66306
DECADE COUNTER 4-BIT SYNCHRONOUS UP/DOWN WITH CLEAR ENABLE	
54LS192	5962-7603601
54LS192	/31507
DECADE COUNTER 4-BIT SYNCHRONOUS WITH ASYNCHRONOUS RESET	
54HC160	5962-8682401
54HC160	/66301
DECADE COUNTER 4-BIT SYNCHRONOUS WITH SYNCHRONOUS CLEAR	
54ALS162	5962-8407901
54ALS162A	/38102
DECADE COUNTER DUAL	
54LS490	/32703
DECADE COUNTER DUAL 4-BIT WITH A AND B INPUTS	
54LS390	/32701
54LS390	5962-7802601
DECADE COUNTER/DIVIDER	
54HC4017	5962-8601101
54HC4017	/66310
DECADE COUNTER/DIVIDER WITH 10 DECODED OUTPUTS TTL-COMPATIBLE INPUTS	
54HCT4017	5962-9059701
DECADE/BINARY COUNTER 4-BIT PRESETTABLE 30 MHZ	
54LS196	5962-7701001
54LS196	/32001
DECADE/BINARY COUNTER PRESETTABLE 50/30-MHZ	
54LS197	5962-7601501
54LS197	/32002
FLIP-FLOP 9-BIT BUS INTERFACE THREE-STATE OUTPUTS INVERTING INPUTS	
54ALS29824	5962-9067502
FLIP-FLOP 9-BIT BUS INTERFACE THREE-STATE OUTPUTS NONINVERTING INPUTS	
54ALS29823	5962-9067501
MULTIPORT REGISTER 8-BIT	
9338	/15701
PIPELINE REGISTER	
AM29C818	5962-9051501
PIPELINE REGISTER 16 X 8 DUAL VARIABLE DELAY 20 NS	
29C525	5962-9169602
PIPELINE REGISTER 16 X 8 DUAL VARIABLE DELAY 25 NS	
29C525	5962-9169601
PIPELINE REGISTER 4 X 8-BIT MULTILEVEL 16 NS	
L29C520	5962-9176203
L29C521	5962-9176206
PIPELINE REGISTER 4 X 8-BIT MULTILEVEL 24 NS	
L29C520	5962-9176202
L29C521	5962-9176205
PIPELINE REGISTER 4 X 8-BIT MULTILEVEL 30 NS	
L29C520	5962-9176201
L29C521	5962-9176204
PIPELINE REGISTER 8-BIT DIAGNOSTIC TTL-COMPATIBLE INPUTS	
54ACT818	5962-9160901
PIPELINE REGISTER MULTILEVEL	
29FCT520A	5962-8873601
29FCT521A	5962-8873602
29FCT520B	5962-8873603
29FCT521B	5962-8873604
PIPELINE REGISTER WITH SERIAL SHADOW REGISTER DIAGNOSTICS	
29818A	5962-8954901
REGISTER FILE 4 X 4	
54170	/01801
REGISTER FILE 4 X 4 THREE-STATE OUTPUTS	
54LS670	5962-7704201
54LS670	/31901
REGISTER FILE 4 X 4 WITH OPEN COLLECTOR OUTPUTS	
54LS170	5962-8002501
54LS170	/31902
REGISTER FILE DUAL 16-WORD BY 4-BIT	
54ALS870	5962-8988901
REGISTER 10-BIT NONINVERTING	
54FCT821A	5962-8860801
54FCT821B	5962-8860802
REGISTER 16-BIT	
93L28	/02803
REGISTER 4 X 16-BIT MULTILEVEL PIPELINE 18 NS	
LPR520	5962-8971603
LPR521	5962-8971606
REGISTER 4 X 16-BIT MULTILEVEL PIPELINE 24 NS	
LPR520	5962-8971602
LPR521	5962-8971605
REGISTER 4 X 16-BIT MULTILEVEL PIPELINE 30 NS	
LPR520	5962-8971601
LPR521	5962-8971604
REGISTER 4-BIT	
54L95	/02801
93L00	/02804
REGISTER 8-BIT	
54L164	/02802
REGISTER 8-BIT SERIAL-IN PARALLEL-OUT	
76L70	/02805
REGISTER 9-BIT NONINVERTING	
54FCT823A	5962-8865601
54FCT823B	5962-8865602
REGISTER 9-BIT WIDE BUFFERED TTL-COMPATIBLE WITH INVERTED 3-STATE OUTPUTS	
54FCT824A	5962-8966501
54FCT824B	5962-8966502
REGISTER BUS INTERFACE 10-WIDE HIGH PERFORMANCE	
29C821	5962-8851601
29C921	5962-8851603
REGISTER BUS INTERFACE 9-WIDE HIGH PERFORMANCE	
29C823	5962-8851602
29C923	5962-8851604
REGISTER D-TYPE HEX PARALLEL	
54F378	/34108
54F378	5962-8855501
REGISTER D-TYPE QUAD WITH STANDARD AND THREE-STATE OUTPUTS	
29LS18	5962-8671901
REGISTER D-TYPE QUAD WITH TO INDEPENDENTLY CONTROLLED THREE-STATE OUTPUTS	
25LS2519	5962-8670201
REGISTER QUAD 2-PORT	
54LS399	5962-8415401
REGISTER QUAD DUAL-PORT TTL-COMPATIBLE	
54FCT399	5962-8965201
54ACT399	5962-9093401
54FCT399A	5962-8965202
REGISTER QUAD TWO-INPUT HIGH-SPEED	
25LS399	5962-8670801
SHIFT REGISTER 1-TO-64 BIT	
4557B	5962-7901601
SHIFT REGISTER 10-BIT NONINVERTING	
54F821	5962-8943801
SHIFT REGISTER 16-BIT PAR. TO SER.	
54LS674	5962-8860701
SHIFT REGISTER 16-BIT SERIAL-IN SERIAL-OUT WITH 16-BIT PARALLEL-OUT STORAGE	
54LS673	5962-8860201
SHIFT REGISTER 16-BIT SERIAL/PARALLEL-IN SERIAL-OUT	
54F676	5962-8854601
SHIFT REGISTER 32-BIT CASCADABLE BARREL 40 NS	
LSH32	5962-8971702
SHIFT REGISTER 32-BIT CASCADABLE BARREL 50 NS	
LSH32	5962-8971701
SHIFT REGISTER 4-BIT	
5495	/00901
9300	/15901
SHIFT REGISTER 4-BIT BIDIRECTIONAL	
54S194	/07601
54S194	5962-7604001
54LS194A	/30601
54S195	/07602
54194	/00905
54195	/00906

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MILITARY PARTS
SORTED BY FUNCTION

Industry P/N	Military* PN
SHIFT REGISTER 4-BIT BIDIRECTIONAL UNIVERSAL	
54HC194	5962-8682601
54HC194	/66504
SHIFT REGISTER 4-BIT BIDIRECTIONAL UNIVERSAL CASCADABLE	
54F194	/33601
54F194	5962-8685001
SHIFT REGISTER 4-BIT BIDIRECTIONAL TS	
54LS295B	/30606
SHIFT REGISTER 4-BIT PARALLEL	
54HC195	5962-8682701
54HC195	/66505
SHIFT REGISTER 4-BIT PARALLEL ACCESS	
54LS195A	/30602
54LS95B	/30603
SHIFT REGISTER 4-BIT PARALLEL-IN/PARALLEL-OUT	
4035B	5962-8101701
14035B	5962-8101702
SHIFT REGISTER 4-BIT UNIVERSAL	
10H541	5962-8751101
SHIFT REGISTER 4-BIT UNIVERSAL TS	
54LS395A	/30607
SHIFT REGISTER 4-BIT WITH THREE-STATE OUTPUTS	
25S10	5962-8671801
54F350	5962-8607501
SHIFT REGISTER 5-BIT	
5496	/00902
54LS96	/30604
SHIFT REGISTER 64-STAGE	
4031B	/05755
SHIFT REGISTER 64-STAGE STATIC	
4031A	/05705
SHIFT REGISTER 8-BIT BIDIRECTIONAL UNIVERSAL	
54F198	5962-9050201
SHIFT REGISTER 8-BIT PARALLEL LOAD	
54LS165A	5962-7700601
54ALS165	5962-8957401
54LS165A	/30608
SHIFT REGISTER 8-BIT PARALLEL-IN SERIAL-OUT	
54HC165	5962-8409501
54HC165	/66502
SHIFT REGISTER 8-BIT PARALLEL-IN SERIAL-OUT WITH LSTTL-COMPATIBLE INPUTS	
54HCT165	5962-8685501
SHIFT REGISTER 8-BIT PARALLEL-INPUT WITH CLEAR	
54LS166	5962-8001701
54LS166	/30609
SHIFT REGISTER 8-BIT PARALLEL-OUT	
54164	/00903
54LS164	/30605
SHIFT REGISTER 8-BIT PARALLEL-OUT SERIAL	
54ALS164	5962-8687001
SHIFT REGISTER 8-BIT PARALLEL/SERIAL INPUT	
54165	/00904
4014A	/05702
4021A	/05704
54HC166	/66503
4014B	/05752
SHIFT REGISTER 8-BIT SERIAL-IN PARALLEL-OUT	
54F164	5962-8607101
SHIFT REGISTER 8-BIT SERIAL-IN/PARALLEL-OUT TTL-COMPATIBLE INPUTS	
54HCT164	5962-8970401
SHIFT REGISTER 8-BIT SERIAL/PARALLEL WITH SIGN EXTEND AND THREE-STATE OUTPUTS	
54F322	5962-8607401
SHIFT REGISTER 8-BIT UNIVERSAL	
4034A	/05706
4034B	/05756
SHIFT REGISTER 8-BIT UNIVERSAL TTL-COMPATIBLE WITH THREE-STATE OUTPUTS	
54FCT299	5962-8686201
54FCT299A	5962-8686202
SHIFT REGISTER 8-BIT UNIVERSAL WITH THREE-STATE OUTPUTS	
54HC299	5962-8780601
54HC299	/66506
SHIFT REGISTER 8-BIT SERIAL-IN/PARALLEL-OUT	
54HC164	5962-8416201
54HC164	/66501
SHIFT REGISTER 8-BIT VARIABLE-LENGTH (1-16 STAGES) 30 MHZ	
TMC2111V	5962-8944602
SHIFT REGISTER 8-BIT WITH I/P LATCH TTL-COMPATIBLE INPUTS	
54HCT597	5962-8974101
SHIFT REGISTER 8-BIT WITH INPUT LATCHES	
54HC597	5962-8681701
SHIFT REGISTER 8-BIT WITH OUTPUT LATCHES	
54HC595	5962-8681601
54HC595	/66507
SHIFT REGISTER 8-BIT WITH THREE-STATE OUTPUTS	
54LS595	5962-8671701
SHIFT REGISTER D-TYPE 4-BIT	
4076B	/17501
SHIFT REGISTER DUAL 4 STAGE/5 STAGE	
4006B	/05751
SHIFT REGISTER DUAL 4-STAGE	
4015A	/05703
4015B	/05753
SHIFT REGISTER DUAL 4-STAGE/5-STAGE	
4006A	/05701
SHIFT REGISTER DUAL 8-BIT	
9328	/15902
SHIFT REGISTER QUAD 2-INPUT	
25S09	5962-8672801
SHIFT REGISTER STATIC	
4021B	5962-7901201
4021B	/05754
SHIFT REGISTER UNIVERSAL	
10541	5962-8855701
SHIFT REGISTER/LATCH 8-STAGE THREE-STATE OUTPUTS	
4094B	5962-7702501
SHIFT/STORAGE REGISTER 8-BIT BIDIRECTIONAL UNIVERSAL WITH THREE-STATE OUTPUTS	
54ALS299	/37601
54ALS299	5962-8302101
54ALS323	5962-8302102
54ALS323	/37602
SHIFT/STORAGE REGISTER 8-BIT UNIVERSAL	
54LS299	5962-7802401
25LS299	5962-7802402
SHIFT/STORAGE REGISTER 8-BIT UNIVERSAL WITH COMMON PARALLEL I/O PINS	
54AC299	5962-8875401
54AC299	/76506
SHIFT/STORAGE REGISTER 8-BIT UNIVERSAL WITH COMMON PARALLEL I/O PINS TTL-COMP	
54ACT299	5962-8877101
SHIFT/STORAGE REGISTER 8-BIT UNIVERSAL WITH SYNCHRONOUS RESET AND COMMON I/O	
54ACT323	5962-9160701
SHIFT/STORAGE REGISTER 8-BIT UNIVERSAL WITH THREE-STATE OUTPUTS	
54F299	5962-8957301
STORAGE REGISTER OCTAL LOW-POWER	
54LS396	5962-9050301
UNIVERSAL COUNTER	
10H536	5962-8700101

RAM /6

Industry P/N	Military* PN
RAM 64K X 4 MULTIPORT VIDEO	
SMJ4461	5962-8956001
DYNAMIC RAM 4K X 1 WITH THREE-STATE OUTPUTS	
MCM6604A	/23602
MCM6605	/23601
DYNAMIC RAM 16K X 1	
(SEE DWG)	5962-8101501
DYNAMIC RAM 16K X 1 200 NS ACCESS TIME	
4116	/24003
2117	/24004
2117	/24002
DYNAMIC RAM 16K X 1 250 NS ACCESS TIME	
2117	/24005
DYNAMIC RAM 16K X 1 WITH THREE-STATE OUTPUTS	
2117	/24001
DYNAMIC RAM 64K X 1 THREE-STATE OUTPUTS 120 NS ACCESS TIME	
(SEE DWG)	5962-8201008
DYNAMIC RAM 64K X 1 THREE-STATE OUTPUTS 150 NS ACCESS TIME	
(SEE DWG)	5962-8201006
(SEE DWG)	5962-8201002
(SEE DWG)	5962-8201009
(SEE DWG)	5962-8201004
(SEE DWG)	5962-8201001
DYNAMIC RAM 64K X 1 THREE-STATE OUTPUTS 200 NS ACCESS TIME	
(SEE DWG)	5962-8201010
(SEE DWG)	5962-8201007
(SEE DWG)	5962-8201005
(SEE DWG)	5962-8201003
DYNAMIC RAM 64K X 1 WITH THREE-STATE OUTPUTS	
2164	/24402
2164	/24401
2164	/24403
DYNAMIC RAM 64K X 4 100 NS ACCESS TIME	
MT4067-10	5962-8767604
DYNAMIC RAM 64K X 4 120 NS ACCESS TIME	
MT4067-12	5962-8767601
DYNAMIC RAM 64K X 4 150 NS ACCESS TIME	
MT4067-15	5962-8767602
DYNAMIC RAM 64K X 4 200 NS ACCESS TIME	
MT4067-20	5962-8767603
DYNAMIC RAM 256K X 1	
M41256N-15	/24604
M41256P-15	/24602
M41256P-12	/24601
M41256N-12	/24603
DYNAMIC RAM 256K X 1 120 NS ACCESS TIME	
(SEE DWG)	5962-8515203
DYNAMIC RAM 256K X 1 150 NS ACCESS TIME	
(SEE DWG)	5962-8515201
DYNAMIC RAM 256K X 1 200 NS ACCESS TIME	
(SEE DWG)	5962-8515202
DYNAMIC RAM 1M X 4 100 NS ACCESS TIME	
(SEE DWG)	5962-9084702
DYNAMIC RAM 1M X 4 120 NS ACCESS TIME	
(SEE DWG)	5962-9084701
DYNAMIC RAM 1M X 4 80 NS	

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Industry P/N	Military* PN
ACCESS TIME	
(SEE DWG)	5962-9084703
DYNAMIC RAM 1024K X 1	
411024-100	/24902
411024-150	/24904
411024-80	/24901
411024-120	/24903
DYNAMIC RAM 4M X 1 100 NS ACCESS TIME	
(SEE DWG)	5962-9062202
DYNAMIC RAM 4M X 1 120 NS ACCESS TIME	
(SEE DWG)	5962-9062201
DYNAMIC RAM 4M X 1 80 NS ACCESS TIME	
(SEE DWG)	5962-9062203
STATIC RAM 16 X 4 15 NS ACCESS TIME	
10545	5962-8856001
STATIC RAM 16 X 4 2-PORT	
29705A	5962-8602501
STATIC RAM 16 X 4 25 NS ACCESS TIME	
7C190	5962-8969401
STATIC RAM 16 X 4 INVERTING THREE-STATE	
54S189	5962-7801502
STATIC RAM 16 X 4 LOW-POWER NONINVERTING THREE-STATE	
27LS07	5962-7801504
27LS07-30	5962-7801506
STATIC RAM 16 X 4 LOW-POWER WITH OPEN COLLECTOR OUTPUTS 65 NS ACCESS TIME	
27LS02	5962-8605103
STATIC RAM 16 X 4 LOW-POWER WITH THREE-STATE OUTPUTS 30 NS ACCESS TIME	
27LS03-30	5962-8605109
STATIC RAM 16 X 4 LOW-POWER WITH THREE-STATE OUTPUTS 65 NS ACCESS TIME	
27LS03	5962-8605106
STATIC RAM 16 X 4 NONINVERTING THREE-STATE	
27S07A	5962-7801501
27S07-20	5962-7801505
27S07	5962-7801503
STATIC RAM 16 X 4 WITH OPEN COLLECTOR OUTPUTS 20 NS ACCESS TIME	
27S02-20	5962-8605107
STATIC RAM 16 X 4 WITH OPEN COLLECTOR OUTPUTS 30 NS ACCESS TIME	
27S02A	5962-8605102
STATIC RAM 16 X 4 WITH OPEN COLLECTOR OUTPUTS 50 NS ACCESS TIME	
27S02	5962-8605101
STATIC RAM 16 X 4 WITH THREE-STATE OUTPUTS 20 NS ACCESS TIME	
27S03-20	5962-8605108
STATIC RAM 16 X 4 WITH THREE-STATE OUTPUTS 30 NS ACCESS TIME	
27S03A	5962-8605105
STATIC RAM 16 X 4 WITH THREE-STATE OUTPUTS 50 NS ACCESS TIME	
27S03	5962-8605104
STATIC RAM 64 X 9 WITH OPEN-COLLECTOR OUTPUTS	
93419	/23201
STATIC RAM 128 X 8	
1823	5962-7901801
6810	/40201
STATIC RAM 256 X 1	
82S16	5962-8602301
93410	/23001
STATIC RAM 256 X 1 INV.	
93L420	/23004
STATIC RAM 256 X 1 WITH OPEN-COLLECTOR OUTPUTS	
93411	/23003
STATIC RAM 256 X 1 WITH OPEN-COLLECTOR OUTPUTS 45 NS ACCESS TIME	
27LS01A	5962-8602004
STATIC RAM 256 X 1 WITH OPEN-COLLECTOR OUTPUTS 55 NS ACCESS TIME	
27LS01	5962-8602003
STATIC RAM 256 X 1 WITH THREE-STATE OUTPUTS	
93421	/23002
STATIC RAM 256 X 1 WITH THREE-STATE OUTPUTS 45 NS ACCESS TIME	
27LS00A	5962-8602002
STATIC RAM 256 X 1 WITH THREE-STATE OUTPUTS 55 NS ACCESS TIME	
27LS00	5962-8602001
STATIC RAM 256 X 4	
7C123	5962-9069603
7C123	5962-9069601
1822	/47102
7C123	5962-9069602
STATIC RAM 256 X 4 15 NS ACCESS TIME	
(SEE DWG)	5962-8859401
STATIC RAM 256 X 4 25 NS ACCESS TIME	
(SEE DWG)	5962-8859403
STATIC RAM 256 X 4 35 NS ACCESS TIME	
(SEE DWG)	5962-8859402
(SEE DWG)	5962-8859501
STATIC RAM 256 X 4 LOW-POWER WITH OPEN-COLLECTOR OUTPUTS 75 NS ACCESS TIME	
93L412	/23111
STATIC RAM 256 X 4 LOW-POWER WITH THREE-STATE OUTPUTS 55 NS ACCESS TIME	
93L422A	/23115
STATIC RAM 256 X 4 LOW-POWER WITH THREE-STATE OUTPUTS 75 NS ACCESS TIME	
93L422	/23112
STATIC RAM 256 X 4 WITH OPEN-COLLECTOR OUTPUTS 60 NS ACCESS TIME	
93412	/23109
STATIC RAM 256 X 4 WITH THREE-STATE OUTPUTS 45 NS ACCESS TIME	
93422A	/23114
STATIC RAM 256 X 4 WITH THREE-STATE OUTPUTS 60 NS ACCESS TIME	
93422	/23110
STATIC RAM 256 X 8	
8X350	5962-8605201
STATIC RAM 256 X 8 WITH I/O PORTS AND TIME	
8156	5962-8759302
STATIC RAM 256 X 8 WITH I/O PORTS AND TIMER	
8155	5962-8759301
STATIC RAM 256 X 9 WITH THREE-STATE OUTPUTS 45 NS ACCESS TIME	
(SEE DWG)	5962-8770303
STATIC RAM 256 X 9 WITH THREE-STATE OUTPUTS 60 NS ACCESS TIME	
(SEE DWG)	5962-8770302
STATIC RAM 256 X 9 WITH THREE-STATE OUTPUTS 70 NS ACCESS TIME	
(SEE DWG)	5962-8770301
STATIC RAM 1K X 1	
1821	/47101
STATIC RAM 1K X 1 LOW-POWER WITH OPEN-COLLECTOR OUTPUTS 70 NS ACCESS TIME	
93L415	/23103
STATIC RAM 1K X 1 LOW-POWER WITH THREE-STATE OUTPUTS 50 NS ACCESS TIME	
93L425A	/23113
STATIC RAM 1K X 1 LOW-POWER WITH THREE-STATE OUTPUTS 70 NS ACCESS TIME	
93L425	/23104
STATIC RAM 1K X 1 WITH OPEN-COLLECTOR OUTPUTS 45 NS ACCESS TIME	
82S10	/23107
STATIC RAM 1K X 1 WITH OPEN-COLLECTOR OUTPUTS 60 NS ACCESS TIME	
93415	/23101
93415	/23105
STATIC RAM 1K X 1 WITH THREE-STATE OUTPUTS 45 NS ACCESS TIME	
82S11	/23108
STATIC RAM 1K X 1 WITH THREE-STATE OUTPUTS 60 NS ACCESS TIME	
93425	/23102
93425	/23106
STATIC RAM 1K X 4	
AM91L30AF	/23706
(SEE DWG)	5962-8102406
AM91L30CFM	/23707
2148H	/23806
AM91L30CF	/23705
6514RH	/24504
AM9130AFM	/23704
(SEE DWG)	5962-8102402
2114A	/23804
6514	/24502
AM91L30AFM	/23708
(SEE DWG)	5962-8102404
AM9130CFC	/23701
AM9130AFC	/23702
AM9130CFM	/23703
CMM5114	/24506
7C148	/28902
STATIC RAM 1K X 4 25 NS ACCESS TIME	
9150-25	5962-8759201
(SEE DWG)	5962-8751304
STATIC RAM 1K X 4 35 NS ACCESS TIME	
(SEE DWG)	5962-8751305
9150-35	5962-8759202
STATIC RAM 1K X 4 40 NS ACCESS TIME	
1HC34-25	/61504
1HC34-25	/61501
STATIC RAM 1K X 4 45 NS ACCESS TIME	
9150-45	5962-8759203
(SEE DWG)	5962-8751306
STATIC RAM 1K X 4 50 NS ACCESS TIME	
1HC34-20	/61502
1HC34-20	/61505
STATIC RAM 1K X 4 67 NS ACCESS TIME	
1HC34-15	/61506
1HC34-15	/61503
STATIC RAM 1K X 4 WITH RESET 15 NS ACCESS TIME	
(SEE DWG)	5962-8858803
STATIC RAM 1K X 4 WITH RESET 25 NS ACCESS TIME	
(SEE DWG)	5962-8858802
STATIC RAM 1K X 4 WITH RESET 35 NS ACCESS TIME	
(SEE DWG)	5962-8858801
STATIC RAM 1K X 4 WITH THREE-STATE OUTPUTS	
2148	/28904
6518	/23902
2114	/23802
6508	/23901
STATIC RAM 1K X 8 DUAL PORT (MASTER) 35 NS ACCESS TIME	
(SEE DWG)	5962-8687517
STATIC RAM 1K X 8 DUAL PORT (MASTER) 45 NS ACCESS TIME	
(SEE DWG)	5962-8687504
(SEE DWG)	5962-8687508
STATIC RAM 1K X 8 DUAL PORT (MASTER) 55 NS ACCESS TIME	
(SEE DWG)	5962-8687507
(SEE DWG)	5962-8687503

*Part numbers beginning with a slash "/" are MIL-M-38510 numbers. All others are DESC drawing numbers.

Industry P/N	Military* PN
STATIC RAM 1K X 8 DUAL PORT (MASTER) 70 NS ACCESS TIME	
(SEE DWG)	5962-8687506
(SEE DWG)	5962-8687502
STATIC RAM 1K X 8 DUAL PORT (MASTER) 90 NS ACCESS TIME	
(SEE DWG)	5962-8687501
(SEE DWG)	5962-8687505
STATIC RAM 1K X 8 DUAL PORT (SLAVE) 35 NS ACCESS TIME	
(SEE DWG)	5962-8687518
STATIC RAM 1K X 8 DUAL PORT (SLAVE) 45 NS ACCESS TIME	
(SEE DWG)	5962-8687512
(SEE DWG)	5962-8687516
STATIC RAM 1K X 8 DUAL PORT (SLAVE) 55 NS ACCESS TIME	
(SEE DWG)	5962-8687515
(SEE DWG)	5962-8687511
STATIC RAM 1K X 8 DUAL PORT (SLAVE) 70 NS ACCESS TIME	
(SEE DWG)	5962-8687514
(SEE DWG)	5962-8687510
STATIC RAM 1K X 8 DUAL PORT (SLAVE) 90 NS ACCESS TIME	
(SEE DWG)	5962-8687509
(SEE DWG)	5962-8687513
STATIC RAM 512 X 8 NON-VOLATILE 300 NS ACCESS TIME	
2004	5962-8771202
STATIC RAM 2K X 16 DUAL PORT (MASTER) 55 NS ACCESS TIME	
(SEE DWG)	5962-8866505
(SEE DWG)	5962-8861005
STATIC RAM 2K X 16 DUAL PORT (MASTER) 70 NS ACCESS TIME	
(SEE DWG)	5962-8861003
(SEE DWG)	5962-8866503
STATIC RAM 2K X 16 DUAL PORT (MASTER) 90 NS ACCESS TIME	
(SEE DWG)	5962-8866501
(SEE DWG)	5962-8861001
STATIC RAM 2K X 16 DUAL PORT (SLAVE) 55 NS ACCESS TIME	
(SEE DWG)	5962-8866506
(SEE DWG)	5962-8861006
STATIC RAM 2K X 16 DUAL PORT (SLAVE) 70 NS ACCESS TIME	
(SEE DWG)	5962-8866504
(SEE DWG)	5962-8861004
STATIC RAM 2K X 16 DUAL PORT (SLAVE) 90 NS ACCESS TIME	
(SEE DWG)	5962-8866502
(SEE DWG)	5962-8861002
STATIC RAM 2K X 8 120 NS ACCESS TIME	
(SEE DWG)	5962-8103902
(SEE DWG)	5962-8403615
(SEE DWG)	5962-8403607
(SEE DWG)	5962-8103907
STATIC RAM 2K X 8 150 NS ACCESS TIME	
(SEE DWG)	5962-8403604
6116	/29101
STATIC RAM 2K X 8 20 NS ACCESS TIME	
(SEE DWG)	5962-8969002
STATIC RAM 2K X 8 200 NS ACCESS TIME	
6516	/29102
(SEE DWG)	5962-8103908
(SEE DWG)	5962-8103904
(SEE DWG)	5962-8103903
6116	/29105
(SEE DWG)	5962-8403601
(SEE DWG)	5962-8403605
(SEE DWG)	5962-8103905
STATIC RAM 2K X 8 25 NS ACCESS TIME	
(SEE DWG)	5962-8969001
STATIC RAM 2K X 8 35 NS ACCESS TIME	
(SEE DWG)	5962-8403614
STATIC RAM 2K X 8 45 NS ACCESS TIME	
(SEE DWG)	5962-8403609
(SEE DWG)	5962-8403608
STATIC RAM 2K X 8 55 NS ACCESS TIME	
(SEE DWG)	5962-8403611
(SEE DWG)	5962-8403610
STATIC RAM 2K X 8 70 NS ACCESS TIME	
(SEE DWG)	5962-8403606
(SEE DWG)	5962-8403613
65162	/29110
(SEE DWG)	5962-8403612
STATIC RAM 2K X 8 90 NS ACCESS TIME	
(SEE DWG)	5962-8403616
(SEE DWG)	5962-8103906
(SEE DWG)	5962-8403602
6116	/29104
(SEE DWG)	5962-8403603
(SEE DWG)	5962-8103901
STATIC RAM 2K X 8 DUAL PORT	
7C146	5962-9062011
7C136	5962-9062008
7C136	5962-9062007
7C142	5962-9062006
7C146	5962-9062012
7C132	5962-9062002
7C132	5962-9062003
7C132	5962-9062001
7C142	5962-9062004
7C146	5962-9062010
7C136	5962-9062009
7C142	5962-9062005
STATIC RAM 2K X 8 DUAL PORT (MASTER) 45 NS ACCESS TIME	
7132SA-45	5962-8700201
7132LA-45	5962-8700205
STATIC RAM 2K X 8 DUAL PORT (MASTER) 55 NS ACCESS TIME	
7132SA-55	5962-8700204
7132LA-55	5962-8700208
STATIC RAM 2K X 8 DUAL PORT (MASTER) 70 NS ACCESS TIME	
7132SA-70	5962-8700203
7132LA-70	5962-8700207
STATIC RAM 2K X 8 DUAL PORT (MASTER) 90 NS ACCESS TIME	
7132LA-90	5962-8700206
7132SA-90	5962-8700202
STATIC RAM 2K X 8 DUAL PORT (SLAVE) 45 NS ACCESS TIME	
7142SA-45	5962-8700209
7142LA-45	5962-8700213
STATIC RAM 2K X 8 DUAL PORT (SLAVE) 55 NS ACCESS TIME	
7142LA-55	5962-8700216
7142SA-55	5962-8700212
STATIC RAM 2K X 8 DUAL PORT (SLAVE) 70 NS ACCESS TIME	
7142SA-70	5962-8700211
7142LA-70	5962-8700215
STATIC RAM 2K X 8 DUAL PORT (SLAVE) 90 NS ACCESS TIME	
7142LA-90	5962-8700214
7142SA-90	5962-8700210
STATIC RAM 2K X 8 LOW-POWER 25 NS ACCESS TIME	
(SEE DWG)	5962-8874002
STATIC RAM 2K X 8 LOW-POWER 35 NS ACCESS TIME	
(SEE DWG)	5962-8874001
STATIC RAM 4K X 1	
MM5280	/23505
AM91L40AFC	/23714
AM91L40CFM	/23715
TMS4060	/23503
AM91L40CFC	/23713
TMS4050	/23502
TMS4060	/23501
6504	/24501
AM9140CFC	/23709
(SEE DWG)	5962-8102403
AM9140AFC	/23710
2147H-2	/23807
2147H	/23803
AM9140AFM	/23712
MCM6604A	/23604
(SEE DWG)	5962-8102407
2147H-3	/23805
CMM5104	/24505
(SEE DWG)	5962-8102401
MM5280	/23506
TMS4050	/23504
AM91L40AFM	/23716
MCM6605	/23603
6504RH	/24503
AM9140CFM	/23711
(SEE DWG)	5962-8102405
STATIC RAM 4K X 1 25 NS ACCESS TIME	
(SEE DWG)	5962-8751301
STATIC RAM 4K X 1 35 NS ACCESS TIME	
(SEE DWG)	5962-8751302
(SEE DWG)	5962-8858702
7C147	/28901
STATIC RAM 4K X 1 45 NS ACCESS TIME	
(SEE DWG)	5962-8858701
(SEE DWG)	5962-8751303
STATIC RAM 4K X 1 WITH OPEN-COLLECTOR OUTPUTS	
93470	/23301
STATIC RAM 4K X 1 WITH THREE-STATE OUTPUTS	
2147	/23801
93471	/23302
2147	/28903
STATIC RAM 4K X 16 DUAL PORT	
7024	5962-9166208
7024	5962-9166207
7024	5962-9166201
7024	5962-9166202
7024	5962-9166206
7024	5962-9166204
7024	5962-9166203
7024	5962-9166205
STATIC RAM 4K X 4 25 NS ACCESS TIME	
(SEE DWG)	5962-8670501
(SEE DWG)	5962-8670502
(SEE DWG)	5962-8670511
STATIC RAM 4K X 4 35 NS ACCESS TIME	
(SEE DWG)	5962-8670503
(SEE DWG)	5962-8670512
(SEE DWG)	5962-8670504
STATIC RAM 4K X 4 40 NS ACCESS TIME	
2169-40	5962-8608106
STATIC RAM 4K X 4 45 NS ACCESS TIME	
2168-45	5962-8608105
(SEE DWG)	5962-8670505
(SEE DWG)	5962-8670506
(SEE DWG)	5962-8670513
STATIC RAM 4K X 4 50 NS ACCESS TIME	
2169-50	5962-8608103
STATIC RAM 4K X 4 55 NS ACCESS TIME	
(SEE DWG)	5962-8670507
2168-55	5962-8608101
(SEE DWG)	5962-8670514
(SEE DWG)	5962-8670508
STATIC RAM 4K X 4 70 NS ACCESS TIME	
2169-70	5962-8608104
2168-70	5962-8608102
(SEE DWG)	5962-8670509
(SEE DWG)	5962-8670510
(SEE DWG)	5962-8670515
STATIC RAM 4K X 4 WITH SEPARATE I/O 25 NS ACCESS TIME	
(SEE DWG)	5962-8861105
STATIC RAM 4K X 4 WITH SEPARATE I/O 35 NS ACCESS TIME	
(SEE DWG)	5962-8861104
STATIC RAM 4K X 4 WITH SEPARATE I/O 45 NS ACCESS TIME	
(SEE DWG)	5962-8861103
STATIC RAM 4K X 4 WITH SEPARATE I/O 55 NS ACCESS TIME	
(SEE DWG)	5962-8861102
STATIC RAM 4K X 4 WITH SEPARATE I/O 70 NS ACCESS TIME	
(SEE DWG)	5962-8861101
STATIC RAM 8K X 16 DUAL PORT	
7025	5962-9161702
7025	5962-9161703
7025	5962-9161704
7025	5962-9161701
7025	5962-9161706
7025	5962-9161707
7025	5962-9161708
7025	5962-9161705

*Part numbers beginning with a slash "/" are MIL-M-38510 numbers. All others are DESC drawing numbers.

MILITARY PARTS SORTED BY FUNCTION

Industry P/N	Military* PN
STATIC RAM 8K X 8	
(SEE DWG)	5962-3829401
(SEE DWG)	5962-8969106
(SEE DWG)	5962-3829412
STATIC RAM 8K X 8 100 NS ACCESS TIME	
(SEE DWG)	5962-3829431
(SEE DWG)	5962-8552503
(SEE DWG)	5962-3829405
(SEE DWG)	5962-3829404
(SEE DWG)	5962-8552512
STATIC RAM 8K X 8 120 NS ACCESS TIME	
(SEE DWG)	5962-3829402
(SEE DWG)	5962-8552502
(SEE DWG)	5962-3829403
(SEE DWG)	5962-8552513
STATIC RAM 8K X 8 15 NS ACCESS TIME	
(SEE DWG)	5962-3829418
(SEE DWG)	5962-3829419
(SEE DWG)	5962-8969104
STATIC RAM 8K X 8 150 NS ACCESS TIME	
(SEE DWG)	5962-8552501
STATIC RAM 8K X 8 20 NS ACCESS TIME	
(SEE DWG)	5962-3829417
(SEE DWG)	5962-3829416
(SEE DWG)	5962-3829430
STATIC RAM 8K X 8 25 NS ACCESS TIME	
(SEE DWG)	5962-8969102
(SEE DWG)	5962-8969101
(SEE DWG)	5962-3829415
(SEE DWG)	5962-3829414
(SEE DWG)	5962-3829428
(SEE DWG)	5962-3829429
STATIC RAM 8K X 8 35 NS ACCESS TIME	
(SEE DWG)	5962-8552507
(SEE DWG)	5962-3829427
(SEE DWG)	5962-3829426
(SEE DWG)	5962-3829413
(SEE DWG)	5962-8552508
STATIC RAM 8K X 8 45 NS ACCESS TIME	
(SEE DWG)	5962-3829425
(SEE DWG)	5962-8552509
(SEE DWG)	5962-8552506
(SEE DWG)	5962-3829410
(SEE DWG)	5962-3829424
(SEE DWG)	5962-3829411
STATIC RAM 8K X 8 55 NS ACCESS TIME	
(SEE DWG)	5962-8552505
(SEE DWG)	5962-3829409
(SEE DWG)	5962-3829437
(SEE DWG)	5962-3829433
(SEE DWG)	5962-3829423
(SEE DWG)	5962-3829408
(SEE DWG)	5962-8552510
(SEE DWG)	5962H3829437
(SEE DWG)	5962-3829422
STATIC RAM 8K X 8 70 NS ACCESS TIME	
(SEE DWG)	5962-3829420
(SEE DWG)	5962-3829432
(SEE DWG)	5962-3829407
(SEE DWG)	5962-8552504
(SEE DWG)	5962-3829406
(SEE DWG)	5962H3829436
(SEE DWG)	5962-8552511
(SEE DWG)	5962-3829436
(SEE DWG)	5962-3829421
STATIC RAM 8K X 8 85 NS ACCESS TIME	
(SEE DWG)	5962H3829435
(SEE DWG)	5962-3829435
STATIC RAM 8K X 8 SELECTABLE MODE	
65543	/29206
65642	/29205
STATIC RAM 8K X 8 SELECTABLE MODE 35 NS ACCESS TIME	
6516-1	/61001
STATIC RAM 8K X 8 SELECTABLE MODE 45 NS ACCESS TIME	
6516-2	/61002
STATIC RAM 8K X 8 SELECTABLE MODE 55 NS ACCESS TIME	
6516-3	/61003
STATIC RAM 8K X 9	
(SEE DWG)	5962-8988303
(SEE DWG)	5962-8988302
(SEE DWG)	5962-8988301
STATIC RAM 8K X 9 25 NS ACCESS TIME	
(SEE DWG)	5962-8868303
STATIC RAM 8K X 9 35 NS ACCESS TIME	
(SEE DWG)	5962-8868302
STATIC RAM 8K X 9 45 NS ACCESS TIME	
(SEE DWG)	5962-8868301
STATIC RAM 16K X 1 100 NS ACCESS TIME	
4167	5962-8200701
STATIC RAM 16K X 1 25 NS ACCESS TIME	
(SEE DWG)	5962-8413207
(SEE DWG)	5962-8413206
STATIC RAM 16K X 1 35 NS ACCESS TIME	
(SEE DWG)	5962-8413204
(SEE DWG)	5962-8413205
STATIC RAM 16K X 1 40 NS ACCESS TIME	
2167-40	5962-8200704
STATIC RAM 16K X 1 45 NS ACCESS TIME	
51C67	/29106
(SEE DWG)	5962-8413202
(SEE DWG)	5962-8413209
STATIC RAM 16K X 1 55 NS ACCESS TIME	
2167-55	5962-8200703
(SEE DWG)	5962-8413208
STATIC RAM 16K X 1 70 NS ACCESS TIME	
2167-70	5962-8200702
(SEE DWG)	5962-8413203
STATIC RAM 16K X 1 85 NS ACCESS TIME	
65262	/29103
(SEE DWG)	5962-8413201
STATIC RAM 16K X 1 WITH THREE-STATE OUTPUTS	
65262	/29109
STATIC RAM 16K X 4	
7B162	5962-9217203
7B166	5962-9159305
51C98-35	/61301
7B166	5962-9159304
7B164	5962-9159303
51C98-55	/61303
7B164	5962-9159302
7B164	5962-9159301
7B162	5962-9217202
7B162	5962-9217201
7B166	5962-9159306
51C98-45	/61302
STATIC RAM 16K X 4 15 NS ACCESS TIME	
(SEE DWG)	5962-8969206
(SEE DWG)	5962-8969205
STATIC RAM 16K X 4 20 NS ACCESS TIME	
(SEE DWG)	5962-8969204
(SEE DWG)	5962-8969203
STATIC RAM 16K X 4 25 NS ACCESS TIME	
(SEE DWG)	5962-8969202
(SEE DWG)	5962-8969201
STATIC RAM 16K X 4 35 NS ACCESS TIME	
(SEE DWG)	5962-8685924
(SEE DWG)	5962-8685918
(SEE DWG)	5962-8685923
(SEE DWG)	5962-8685909
(SEE DWG)	5962-8685910
(SEE DWG)	5962-8685917
STATIC RAM 16K X 4 45 NS ACCESS TIME	
(SEE DWG)	5962-8685921
(SEE DWG)	5962-8685922
(SEE DWG)	5962-8685915
(SEE DWG)	5962-8685907
(SEE DWG)	5962-8685916
(SEE DWG)	5962-8685908
STATIC RAM 16K X 4 55 NS ACCESS TIME	
(SEE DWG)	5962-8685920
(SEE DWG)	5962-8685919
(SEE DWG)	5962-8685906
(SEE DWG)	5962-8685914
(SEE DWG)	5962-8685905
(SEE DWG)	5962-8685913
STATIC RAM 16K X 4 70 NS ACCESS TIME	
(SEE DWG)	5962-8685912
(SEE DWG)	5962-8685911
(SEE DWG)	5962-8685903
(SEE DWG)	5962-8685904
STATIC RAM 16K X 4 85 NS ACCESS TIME	
(SEE DWG)	5962-8685902
(SEE DWG)	5962-8685901
STATIC RAM 16K X 4 WITH OE AND CE 20 NS ACCESS TIME	
(SEE DWG)	5962-8989103
STATIC RAM 16K X 4 WITH OE AND DUAL CE 15 NS ACCESS TIME	
(SEE DWG)	5962-8989106
(SEE DWG)	5962-8989105
STATIC RAM 16K X 4 WITH OE AND DUAL CE 20 NS ACCESS TIME	
(SEE DWG)	5962-8989104
STATIC RAM 16K X 4 WITH OE AND DUAL CE 25 NS ACCESS TIME	
(SEE DWG)	5962-8989102
STATIC RAM 16K X 4 WITH OE AND DUAL CE 25 NS DATA RETENTION	
(SEE DWG)	5962-8989101
STATIC RAM 16K X 4 WITH OE 15 NS ACCESS TIME	
(SEE DWG)	5962-8989205
(SEE DWG)	5962-8989206
STATIC RAM 16K X 4 WITH OE 20 NS ACCESS TIME	
(SEE DWG)	5962-8989203
(SEE DWG)	5962-8989204
STATIC RAM 16K X 4 WITH OE 25 NS ACCESS TIME	
(SEE DWG)	5962-8989202
(SEE DWG)	5962-8989201
STATIC RAM 16K X 4 WITH SEPARATE I/O 20 NS ACCESS TIME	
(SEE DWG)	5962-8971204
STATIC RAM 16K X 4 WITH SEPARATE I/O 25 NS ACCESS TIME	
(SEE DWG)	5962-8971203
STATIC RAM 16K X 4 WITH SEPARATE I/O 35 NS ACCESS TIME	
(SEE DWG)	5962-8971202
STATIC RAM 16K X 4 WITH SEPARATE I/O 45 NS ACCESS TIME	
(SEE DWG)	5962-8971201
STATIC RAM 16K X 8 DUAL PORT	
7006	5962-9150803
7006	5962-9150805
7006	5962-9150801
7006	5962-9150802
7006	5962-9150804
7006	5962-9150806
STATIC RAM 32K X 8 100 NS ACCESS TIME	
(SEE DWG)	5962-8866201
STATIC RAM 32K X 8 25 NS ACCESS TIME	
(SEE DWG)	5962-8866206
STATIC RAM 32K X 8 35 NS ACCESS TIME	
(SEE DWG)	5962-8866205
STATIC RAM 32K X 8 60 NS ACCESS TIME	
(SEE DWG)	5962H9215301
STATIC RAM 32K X 8 70 NS ACCESS TIME	
(SEE DWG)	5962-8866202
STATIC RAM 32K X 8 LOW-POWER 100 NS ACCESS TIME	
(SEE DWG)	5962-8855201
STATIC RAM 32K X 8 LOW-POWER 25 NS ACCESS TIME	
(SEE DWG)	5962-8855206
STATIC RAM 32K X 8 LOW-POWER 35 NS ACCESS TIME	
(SEE DWG)	5962-8855205
STATIC RAM 32K X 8 LOW-POWER 45 NS ACCESS TIME	
(SEE DWG)	5962-8855204
(SEE DWG)	5962-8855209
STATIC RAM 32K X 8 LOW-POWER 55 NS ACCESS TIME	
(SEE DWG)	5962-8855203
(SEE DWG)	5962-8855208
STATIC RAM 32K X 8 LOW-	

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MILITARY PARTS SORTED BY FUNCTION

Industry P/N	Military* PN
POWER 70 NS ACCESS TIME	
(SEE DWG)	5962-8855207
(SEE DWG)	5962-8855202
STATIC RAM 32K X 8 WITH OUTPUT ENABLE 20 NS ACCESS TIME	
MT5C2568	/29317
STATIC RAM 32K X 8 WITH OUTPUT ENABLE 25 NS ACCESS TIME	
7C198	/29313
STATIC RAM 32K X 8 WITH OUTPUT ENABLE 35 NS ACCESS TIME	
7C198	/29309
STATIC RAM 32K X 8 WITH OUTPUT ENABLE 45 NS ACCESS TIME	
7C198	/29308
(SEE DWG)	5962-8866204
STATIC RAM 32K X 8 WITH OUTPUT ENABLE 55 NS ACCESS TIME	
(SEE DWG)	5962-8866203
7C198	/29307
STATIC RAM 32K X 8 WITH OUTPUT ENABLE LOW POWER 20 NS ACCESS TIME	
MT5C2568	/29328
STATIC RAM 32K X 8 WITH OUTPUT ENABLE LOW POWER 25 NS ACCESS TIME	
MT5C2568	/29327
STATIC RAM 32K X 8 WITH OUTPUT ENABLE LOW POWER 35 NS ACCESS TIME	
MT5C2568	/29326
STATIC RAM 32K X 8 WITH OUTPUT ENABLE LOW POWER 45 NS ACCESS TIME	
MT5C2568	/29325
STATIC RAM 62K X 16 70 NS ACCESS TIME	
(SEE DWG)	5962-9085806
STATIC RAM 64K X 1 15 NS ACCESS TIME	
(SEE DWG)	5962-8969606
(SEE DWG)	5962-8969605
STATIC RAM 64K X 1 20 NS ACCESS TIME	
(SEE DWG)	5962-8969604
(SEE DWG)	5962-8969603
STATIC RAM 64K X 1 25 NS ACCESS TIME	
(SEE DWG)	5962-8969602
(SEE DWG)	5962-8969601
STATIC RAM 64K X 1 WITH THREE-STATE OUTPUTS 35 NS ACCESS TIME	
(SEE DWG)	5962-8601501
(SEE DWG)	5962-8601502
STATIC RAM 64K X 1 WITH THREE-STATE OUTPUTS 45 NS ACCESS TIME	
(SEE DWG)	5962-8601503
7187S45	/29202
(SEE DWG)	5962-8601504
STATIC RAM 64K X 1 WITH THREE-STATE OUTPUTS 55 NS ACCESS TIME	
7187L55	/29203
(SEE DWG)	5962-8601505
(SEE DWG)	5962-8601506
7187S55	/29201
STATIC RAM 64K X 1 WITH THREE-STATE OUTPUTS 70 NS ACCESS TIME	
7187L70	/29204
(SEE DWG)	5962-8601508
(SEE DWG)	5962-8601507
STATIC RAM 64K X 16 100 NS ACCESS TIME	
(SEE DWG)	5962-9085802
STATIC RAM 64K X 16 55 NS ACCESS TIME	
(SEE DWG)	5962-9085808
STATIC RAM 64K X 16 85 NS ACCESS TIME	
(SEE DWG)	5962-9085804
STATIC RAM 64K X 16 LOW-POWER 100 NS ACCESS TIME	
(SEE DWG)	5962-9085801
STATIC RAM 64K X 16 LOW-POWER 55 NS ACCESS TIME	
(SEE DWG)	5962-9085807
STATIC RAM 64K X 16 LOW-POWER 70 NS ACCESS TIME	
(SEE DWG)	5962-9085805
STATIC RAM 64K X 16 LOW-POWER 85 NS ACCESS TIME	
(SEE DWG)	5962-9085803
STATIC RAM 64K X 4	
7C191	5962-9066403
7C191	5962-9066402
7C192	5962-8993501
7C192	5962-8993502
7C194	/29319
MT5C2565	/29320
7C192	5962-8993503
7C191	5962-9066401
STATIC RAM 64K X 4 20 NS ACCESS TIME	
7C194	5962-29319BL
STATIC RAM 64K X 4 25 NS ACCESS TIME	
7C194	/29311
STATIC RAM 64K X 4 35 NS ACCESS TIME	
7C194	/29304
(SEE DWG)	5962-8868101
STATIC RAM 64K X 4 45 NS ACCESS TIME	
7C194	/29303
(SEE DWG)	5962-8868102
STATIC RAM 64K X 4 55 NS ACCESS TIME	
(SEE DWG)	5962-8868103
(SEE DWG)	5962-8952402
STATIC RAM 64K X 4 70 NS ACCESS TIME	
(SEE DWG)	5962-8868104
(SEE DWG)	5962-8952401
STATIC RAM 64K X 4 LOW POWER 20 NS ACCESS TIME	
7C194	/29332
STATIC RAM 64K X 4 LOW POWER 35 NS ACCESS TIME	
7C194	/29330
STATIC RAM 64K X 4 LOW POWER 45 NS ACCESS TIME	
7C194	/29329
STATIC RAM 64K X 4 LOW-POWER 35 NS ACCESS TIME	
(SEE DWG)	5962-8854501
STATIC RAM 64K X 4 LOW-POWER 45 NS ACCESS TIME	
(SEE DWG)	5962-8854502
STATIC RAM 64K X 4 LOW-POWER 55 NS ACCESS TIME	
(SEE DWG)	5962-8854503
STATIC RAM 64K X 4 LOW-POWER 70 NS ACCESS TIME	
(SEE DWG)	5962-8854504
STATIC RAM 64K X 4 WITH OUTPUT ENABLE 20 NS ACCESS TIME	
MT5C2565	5962-29320BN
STATIC RAM 64K X 4 WITH OUTPUT ENABLE 25 NS ACCESS TIME	
MT5C2565	/29312
(SEE DWG)	5962-8952405
7C196	/29316
STATIC RAM 64K X 4 WITH OUTPUT ENABLE 35 NS ACCESS TIME	
(SEE DWG)	5962-8952404
MT5C2565	/29315
7C196	/29306
STATIC RAM 64K X 4 WITH OUTPUT ENABLE 45 NS ACCESS TIME	
(SEE DWG)	5962-8952403
MT5C2565	/29314
7C196	/29305
STATIC RAM 64K X 4 WITH OUTPUT ENABLE LOW POWER 20 NS ACCESS TIME	
MT5C2565	/29324
STATIC RAM 64K X 4 WITH OUTPUT ENABLE LOW POWER 25 NS ACCESS TIME	
MT5C2565	/29323
STATIC RAM 64K X 4 WITH OUTPUT ENABLE LOW POWER 35 NS ACCESS TIME	
MT5C2565	/29322
STATIC RAM 64K X 4 WITH OUTPUT ENABLE LOW POWER 45 NS ACCESS TIME	
MT5C2565	/29321
STATIC RAM 64K X 4 LOW POWER 25 NS ACCESS TIME	
7C194	/29331
STATIC RAM 128K X 8	
WS-128K8-45C	5962-9315606
WS-128K8-55C	5962-9315605
WS-128K8-70C	5962-9315604
WS-128K8-35C	5962-9315607
WS-128K8-120	5962-9315601
WS-128K8-100	5962-9315602
WS-128K8-25C	5962-9315608
WS-128K8-85C	5962-9315603
STATIC RAM 128K X 8 LOW-POWER 100 NS ACCESS TIME	
(SEE DWG)	5962-8959802
(SEE DWG)	5962-8959806
STATIC RAM 128K X 8 LOW-POWER 120 NS ACCESS TIME	
(SEE DWG)	5962-8959805
(SEE DWG)	5962-8959801
STATIC RAM 128K X 8 LOW-POWER 25 NS ACCESS TIME	
(SEE DWG)	5962-8959812
STATIC RAM 128K X 8 LOW-POWER 35 NS ACCESS TIME	
(SEE DWG)	5962-8959811
STATIC RAM 128K X 8 LOW-POWER 45 NS ACCESS TIME	
(SEE DWG)	5962-8959810
STATIC RAM 128K X 8 LOW-POWER 55 NS ACCESS TIME	
(SEE DWG)	5962-8959809
STATIC RAM 128K X 8 LOW-POWER 70 NS ACCESS TIME	
(SEE DWG)	5962-8959804
(SEE DWG)	5962-8959808
STATIC RAM 128K X 8 LOW-POWER 85 NS ACCESS TIME	
(SEE DWG)	5962-8959807
(SEE DWG)	5962-8959803
STATIC RAM 128K X 8 LOW-POWER DUAL CE 100 NS ACCESS TIME	
(SEE DWG)	5962-8959814
STATIC RAM 128K X 8 LOW-POWER DUAL CE 120 NS ACCESS TIME	
(SEE DWG)	5962-8959813
STATIC RAM 128K X 8 LOW-POWER DUAL CE 20 NS ACCESS TIME	
(SEE DWG)	5962-8959821
STATIC RAM 128K X 8 LOW-POWER DUAL CE 25 NS ACCESS TIME	
(SEE DWG)	5962-8959820
STATIC RAM 128K X 8 LOW-POWER DUAL CE 35 NS ACCESS TIME	
(SEE DWG)	5962-8959819
STATIC RAM 128K X 8 LOW-POWER DUAL CE 45 NS ACCESS TIME	
(SEE DWG)	5962-8959818
STATIC RAM 128K X 8 LOW-POWER DUAL CE 55 NS ACCESS TIME	
(SEE DWG)	5962-8959817
STATIC RAM 128K X 8 LOW-POWER DUAL CE 70 NS ACCESS TIME	
(SEE DWG)	5962-8959816
STATIC RAM 128K X 8 LOW-POWER DUAL CE 85 NS ACCESS TIME	
(SEE DWG)	5962-8959815
STATIC RAM 128K X 8 STAN-	

*Part numbers beginning with a slash "/" are MIL-M-38510 numbers. All others are DESC drawing numbers.

MILITARY PARTS
SORTED BY FUNCTION

Industry P/N	Military* PN
DARD POWER 100 NS ACCESS TIME	
(SEE DWG)	5962-8959823
STATIC RAM 128K X 8 STANDARD POWER 120 NS ACCESS TIME	
(SEE DWG)	5962-8959822
STATIC RAM 128K X 8 STANDARD POWER 25 NS ACCESS TIME	
(SEE DWG)	5962-8959829
STATIC RAM 128K X 8 STANDARD POWER 35 NS ACCESS TIME	
(SEE DWG)	5962-8959828
STATIC RAM 128K X 8 STANDARD POWER 45 NS ACCESS TIME	
(SEE DWG)	5962-8959827
STATIC RAM 128K X 8 STANDARD POWER 55 NS ACCESS TIME	
(SEE DWG)	5962-8959826
STATIC RAM 128K X 8 STANDARD POWER 70 NS ACCESS TIME	
(SEE DWG)	5962-8959825
STATIC RAM 128K X 8 STANDARD POWER 85 NS ACCESS TIME	
(SEE DWG)	5962-8959824
STATIC RAM 128K X 8 STANDARD POWER DUAL CE 100 NS ACCESS TIME	
(SEE DWG)	5962-8959831
STATIC RAM 128K X 8 STANDARD POWER DUAL CE 120 NS ACCESS TIME	
(SEE DWG)	5962-8959830
STATIC RAM 128K X 8 STANDARD POWER DUAL CE 20 NS ACCESS TIME	
(SEE DWG)	5962-8959838
STATIC RAM 128K X 8 STANDARD POWER DUAL CE 25 NS ACCESS TIME	
(SEE DWG)	5962-8959837
STATIC RAM 128K X 8 STANDARD POWER DUAL CE 35 NS ACCESS TIME	
(SEE DWG)	5962-8959836
STATIC RAM 128K X 8 STANDARD POWER DUAL CE 45 NS ACCESS TIME	
(SEE DWG)	5962-8959835
STATIC RAM 128K X 8 STANDARD POWER DUAL CE 55 NS ACCESS TIME	
(SEE DWG)	5962-8959834
STATIC RAM 128K X 8 STANDARD POWER DUAL CE 70 NS ACCESS TIME	
(SEE DWG)	5962-8959833
STATIC RAM 128K X 8 STANDARD POWER DUAL CE 85 NS ACCESS TIME	
(SEE DWG)	5962-8959832
STATIC RAM 256K X 1	
7C197	/29318
7C197	/29335
7C197	/29334
7C197	/29333
7C197	/29336
STATIC RAM 256K X 1 20 NS ACCESS TIME	
7C197	5962-29318BL
STATIC RAM 256K X 1 25 NS ACCESS TIME	
7C197	/29310
(SEE DWG)	5962-8872505
STATIC RAM 256K X 1 35 NS ACCESS TIME	
7C197	/29302
(SEE DWG)	5962-8872501
STATIC RAM 256K X 1 45 NS ACCESS TIME	
7C197	/29301
(SEE DWG)	5962-8872502
STATIC RAM 256K X 1 55 NS ACCESS TIME	
(SEE DWG)	5962-8872503
STATIC RAM 256K X 1 70 NS ACCESS TIME	
(SEE DWG)	5962-8872504
STATIC RAM 256K X 1 LOW POWER 20 NS ACCESS TIME	
7C197	5962-29336BL
STATIC RAM 256K X 1 LOW POWER 25 NS ACCESS TIME	
7C197	5962-29335BL
STATIC RAM 256K X 1 LOW POWER 35 NS ACCESS TIME	
7C197	5962-29334BL
STATIC RAM 256K X 1 LOW POWER 45 NS ACCESS TIME	
7C197	5962-29333BL
STATIC RAM 256K X 1 LOW-POWER 35 NS ACCESS TIME	
(SEE DWG)	5962-8854401
STATIC RAM 256K X 1 LOW-POWER 45 NS ACCESS TIME	
(SEE DWG)	5962-8854402
STATIC RAM 256K X 1 LOW-POWER 55 NS ACCESS TIME	
(SEE DWG)	5962-8854403
STATIC RAM 256K X 1 LOW-POWER 70 NS ACCESS TIME	
(SEE DWG)	5962-8854404
STATIC RAM 256K X 8	
WS-256K8-25C	5962-9315708
WS-256K8-35C	5962-9315707
WS-256K8-85C	5962-9315703
WS-256K8-70C	5962-9315704
WS-256K8-120	5962-9315701
WS-256K8-100	5962-9315702
WS-256K8-55C	5962-9315705
WS-256K8-45C	5962-9315706
STATIC RAM NON-VOLATILE 256 X 4 300 NS ACCESS TIME	
(SEE DWG)	5962-8995101
(SEE DWG)	5962-8995102
(SEE DWG)	5962-8995103
STATIC RAM NON-VOLATILE 512 X 8 250 NS ACCESS TIME	
2004-25	5962-8771201
STATIC RAM RAD-HARD 16K X 1 WITH THREE-STATE OUTPUTS	
65C262RH	/29107
65T262RH	/29108

ROM/PROM/PAL /7

Industry P/N	Military* PN
FIELD PROGRAMMABLE GATE ARRAY 1200 GATE	
1010	5962-9096401
GATE ARRAY FIELD PROGRAMMABLE 2000 GATE	
1020	5962-9096501
LOGIC ARRAY 18 X 42 X 10 FIELD-PROGRAMMABLE	
82S153A	5962-8768201
LOGIC ARRAY 38-INPUT 24-OUTPUT AND-OR 25 NS ACCESS TIME	
V2500H	5962-9154602
LOGIC ARRAY 38-INPUT 24-OUTPUT AND-OR 35 NS ACCESS TIME	
V2500H	5962-9154601
LOGIC ARRAY 38-INPUT 25-OUTPUT AND-OR 25 NS ACCESS TIME	
V2500H	5962-9154502
LOGIC ARRAY 38-INPUT 25-OUTPUT AND-OR 35 NS ACCESS TIME	
V2500H	5962-9154501
LOGIC DEVICE ERASABLE PROGRAMMABLE 1800-GATE 90 NS ACCESS TIME	
(SEE DWG)	5962-8854901
LOGIC DEVICE ERASABLE PROGRAMMABLE 600-GATE	
(SEE DWG)	5962-8686401
LOGIC SEQUENCER FIELD PROGRAMMABLE (20 X 45 X 12)	
PLS179	5962-8850701
LOGIC SEQUENCER FIELD PROGRAMMABLE 16 X 48 X 8	
82S105	5962-8670901
82S105	5962-8670902
PROG. ARRAY LOGIC 16X48X8	
82S100	/50202
PROG. ARRAY LOGIC 10 X 10 1800-GATE 33 MHZ TOGGLE SPEED	
2018	5962-8863802
PROG. ARRAY LOGIC 10 X 10 1800-GATE 50 MHZ TOGGLE SPEED	
2018	5962-8863803
PROG. ARRAY LOGIC 10 X 10 1800-GATE 70 MHZ TOGGLE SPEED	
2018	5962-8863804
PROG. ARRAY LOGIC 10-INPUT 8-OUTPUT AND-OR	
PAL10H8	5962-8103501
PAL10H8	/50301
PROG. ARRAY LOGIC 10-INPUT 8-OUTPUT AND-OR-INVERT	
PAL10L8	5962-8103506
PAL10L8	/50306
PAL10L8A	5962-8103514
PAL10L8A	/50315
PROG. ARRAY LOGIC 12 X 48 X 8	
PLS161	5962-8850401
PROG. ARRAY LOGIC 12-INPUT 10-OUTPUT AND-OR-INVERT	
PAL12L10	5962-8680402
PROG. ARRAY LOGIC 12-INPUT 6-OUTPUT AND-OR	
PAL12H6	5962-8103502
PAL12H6	/50302
PAL12H6A	5962-8103511
PAL12H6A	/50311
PROG. ARRAY LOGIC 12-INPUT 6-OUTPUT AND-OR-INVERT	
PAL12L6	5962-8103507
PAL12L6	/50307
PAL12L6A	5962-8103515
PAL12L6A	/50316
PROG. ARRAY LOGIC 14-INPUT 4-OUTPUT AND-OR	
PAL14H4	5962-8103503
PAL14H4	/50303
PAL14H4A	5962-8103512
PAL14H4A	/50312
PROG. ARRAY LOGIC 14-INPUT 4-OUTPUT AND-OR-INVERT	
PAL14L4	5962-8103508
PAL14L4	/50308
PAL14L4A	5962-8103516
PAL14L4A	/50317
PROG. ARRAY LOGIC 14-INPUT 8-OUTPUT AND-OR-INVERT	
PAL14L8	5962-8680403
PROG. ARRAY LOGIC 16-INPUT 2 OUTPUT AND-OR-INVERT	
PAL16L2A	5962-8103517
PAL16L2A	/50318
PROG. ARRAY LOGIC 16-INPUT 2-OUTPUT AND-OR	
PAL16H2	5962-8103504
PAL16H2	/50304
PAL10H8A	5962-8103510
PAL10H8A	/50310
PAL16H2A	5962-8103513
PAL16H2A	/50313
PROG. ARRAY LOGIC 16-INPUT 2-OUTPUT AND-OR/AND-OR-INVERT	
PAL16C1	5962-8103505
PAL16C1	/50305
PROG. ARRAY LOGIC 16-INPUT 4-OUTPUT AND-OR	
PAL16R4A	5962-8103610
PAL16R4A	/50404

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MILITARY PARTS
SORTED BY FUNCTION

Industry P/N	Military* PN
PROG. ARRAY LOGIC 16-INPUT 4-OUTPUT REGISTERED AND-CARRY-OR EXCLUSIVE OR	
PAL16A4	5962-8103606
PAL16A4	/50406
PROG. ARRAY LOGIC 16-INPUT 4-OUTPUT REGISTERED AND-OR	
C16R4-40	5962-8871304
PAL16R4A-4	5962-8506504
PAL16R4-20	5962-8515504
PAL16R4-30	5962-8515508
C16R4-30	5962-8871308
C16R4-20	5962-8871312
PAL16R4-15	5962-8515512
PAL16R4-12	5962-8515516
PAL16R4-10	5962-8515520
PAL16R4	5962-8103604
PAL16R4A-2	5962-8103614
PAL16R4A2	/50410
PAL16R4B	/50604
PAL16R4B2	/50608
PAL16R4-15	/50612
PROG. ARRAY LOGIC 16-INPUT 4-OUTPUT REGISTERED AND-OR EXCLUSIVE OR	
PAL16X4	5962-8103605
PAL16X4	/50405
PROG. ARRAY LOGIC 16-INPUT 6-OUTPUT AND-OR	
PAL16R6A	5962-8103609
PAL16R6A	/50403
PROG. ARRAY LOGIC 16-INPUT 6-OUTPUT AND-OR-INVERT	
PAL16L6	5962-8680404
PROG. ARRAY LOGIC 16-INPUT 6-OUTPUT REGISTERED AND-OR	
C16R6-40	5962-8871303
PAL16R6-20	5962-8515503
PAL16R6A-4	5962-8506503
PAL16R6-30	5962-8515507
C16R6-30	5962-8871307
PAL16R6-15	5962-8515511
C16R6-20	5962-8871311
PAL16R6-12	5962-8515515
PAL16R6-10	5962-8515519
PAL16R6	5962-8103603
PAL16R6A-2	5962-8103613
PAL16R6A2	/50409
PAL16R6B	/50603
PAL16R6B2	/50607
PAL16R6-15	/50611
PROG. ARRAY LOGIC 16-INPUT 8 OUTPUT AND-OR-INVERT	
PAL16L8A-2	5962-8103611
PAL16L8A2	/50407
PROG. ARRAY LOGIC 16-INPUT 8-OUTPUT 4-REGISTER AND-OR-INVERT	
(SEE DWG)	5962-8851504
PROG. ARRAY LOGIC 16-INPUT 8-OUTPUT 6-REGISTER AND-OR-INVERT	
(SEE DWG)	5962-8851503
PROG. ARRAY LOGIC 16-INPUT 8-OUTPUT 8-REGISTER AND-OR-INVERT	
(SEE DWG)	5962-8851502
PROG. ARRAY LOGIC 16-INPUT 8-OUTPUT AND-OR	
PAL16R8A	5962-8103608
PAL16R8A	/50402
PROG. ARRAY LOGIC 16-INPUT 8-OUTPUT AND-OR-INVERT	
C16L8-40	5962-8871301
PAL16L8-20	5962-8515501
PAL16L8A-4	5962-8506501
C16L8-30	5962-8871305
PAL16L8-30	5962-8515505
PAL16L8-15	5962-8515509
C16L8-20	5962-8871309
PAL16L8A-12	5962-8515513
PAL16L8-10	5962-8515517
PAL16L8	5962-8103601
PAL16L8A	5962-8103607
PAL16L8A	/50401
PAL16L8B	/50601
PAL16L8B2	/50605
PAL16L8-15	/50609
PROG. ARRAY LOGIC 16-INPUT 8-OUTPUT COMBINATORIAL AND-OR-INVERT	
(SEE DWG)	5962-8851501
PROG. ARRAY LOGIC 16-INPUT 8-OUTPUT REGISTERED AND-OR	
PAL16R8-20	5962-8515502
C16R8-40	5962-8871302
PAL16R8A-4	5962-8506502
PAL16R8-30	5962-8515506
C16R8-30	5962-8871306
C16R8-20	5962-8871310
PAL16R8-15	5962-8515510
PAL16R8A-12	5962-8515514
PAL16R8-10	5962-8515518
PAL16R8	5962-8103602
PAL16R8A-2	5962-8103612
PAL16R8A2	/50408
PAL16R8B	/50602
PAL16R8B2	/50606
PAL16R8-15	/50610
PROG. ARRAY LOGIC 16X48X8	
82S101	/50201
PROG. ARRAY LOGIC 18-INPUT 4-OUTPUT AND-OR	
PAL18L4	5962-8680401
PROG. ARRAY LOGIC 18-INPUT 8-OUTPUT AND-OR	
PAL18P8A	5962-8752801
PAL18P8B	5962-8752802
PAL18P8AL	5962-8752803
PAL18P8L	5962-8752804
PAL18P8Q	5962-8752805
PROG. ARRAY LOGIC 20-INPUT 10-OUTPUT AND-OR WITH PRODUCT TERM SHARING	
(SEE DWG)	5962-8753001
PROG. ARRAY LOGIC 20-INPUT 10-OUTPUT AND-OR-INVERT	
PAL20L10A	5962-8412905
PROG. ARRAY LOGIC 20-INPUT 10-OUTPUT REGISTERED AND-OR	
PAL20RA10	5962-8680301
PROG. ARRAY LOGIC 20-INPUT 10-OUTPUT REGISTERED AND-OR W/ PRODUCT TERM SHARING	
(SEE DWG)	5962-8753002
PROG. ARRAY LOGIC 20-INPUT 10-OUTPUT REGISTERED AND-OR-XOR	
PAL20X10A	5962-8412907
PROG. ARRAY LOGIC 20-INPUT 2-OUTPUT AND-OR-INVERT	
PAL20L2	5962-8680405
PAL20C1	5962-8680406
PROG. ARRAY LOGIC 20-INPUT 4-OUTPUT REGISTERED AND-OR	
PAL20R4A	5962-8412904
PAL20R4B	5962-8767104
PAL20L4-15	5962-8767110
PAL20R4A-2	5962-8412912
PAL20R4-12	5962-8767114
PAL20R4-10	5962-8767118
PAL20R4A	/50504
PROG. ARRAY LOGIC 20-INPUT 4-OUTPUT REGISTERED AND-OR W/PRODUCT TERM SHARING	
(SEE DWG)	5962-8753004
PROG. ARRAY LOGIC 20-INPUT 4-OUTPUT REGISTERED AND-OR-XOR	
PAL20X4A	5962-8412908
PROG. ARRAY LOGIC 20-INPUT 6-OUTPUT REGISTERED AND-OR	
PAL20R6B	5962-8767103
PAL20R6A	5962-8412903
PAL20R6-15	5962-8767109
PAL20R6A-2	5962-8412911
PAL20R6-12	5962-8767113
PAL20R6-10	5962-8767117
PAL20R6A	/50503
PROG. ARRAY LOGIC 20-INPUT 8-OUTPUT AND-OR INVERT	
PAL20L8-12	5962-8767111
PAL20L8-10	5962-8767115
PROG. ARRAY LOGIC 20-INPUT 8-OUTPUT AND-OR-INVERT	
PAL20L8B	5962-8767101
PAL20L8A	5962-8412901
PLUS20L8	5962-8767105
PAL20L8-15	5962-8767107
PAL20L8A-2	5962-8412909
PAL20L8A	/50501
PROG. ARRAY LOGIC 20-INPUT 8-OUTPUT REGISTERED AND-OR	
PAL20R8B	5962-8767102
PAL20R8A	5962-8412902
PLUS20R8	5962-8767106
PAL20R8-15	5962-8767108
PAL20R8A-2	5962-8412910
PAL20R8-12	5962-8767112
PAL20R8-10	5962-8767116
PAL20R8A	/50502
PROG. ARRAY LOGIC 20-INPUT 8-OUTPUT REGISTERED AND-OR W/PRODUCT TERM SHARING	
(SEE DWG)	5962-8753003
PROG. ARRAY LOGIC 20-INPUT 8-OUTPUT REGISTERED AND-OR-XOR	
PAL20X8A	5962-8412906
PROG. ARRAY LOGIC 22 X 42 X 10	
PLS173	5962-8850402
PROG. ARRAY LOGIC 22-INPUT 10 OUTPUT REGISTERED AND-OR	
PAL22VP10-25	5962-8605303
PROG. ARRAY LOGIC 22-INPUT 10-OUTPUT AND-OR	
C22V10L	5962-8975501
C22V10L	5962-8975502
C22V10L	5962-8975503
C22V10L	5962-8975504
PROG. ARRAY LOGIC 22-INPUT 10-OUTPUT AND-OR 15 NS ACCESS TIME	
C22V10	5962-8867005
PROG. ARRAY LOGIC 22-INPUT 10-OUTPUT AND-OR 20 NS ACCESS TIME	
C22V10	5962-8867004
C22V10	/50703
PROG. ARRAY LOGIC 22-INPUT 10-OUTPUT AND-OR 25 NS ACCESS TIME	
C22V10	5962-8867001
C22V10	/50702
PROG. ARRAY LOGIC 22-INPUT 10-OUTPUT AND-OR 30 NS ACCESS TIME	
C22V10	5962-8867002
C22V10	/50701
PROG. ARRAY LOGIC 22-INPUT 10-OUTPUT AND-OR 40 NS ACCESS TIME	
C22V10	5962-8867003
PROG. ARRAY LOGIC 22-INPUT 10-OUTPUT REGISTERED AND-OR	
PAL22V10A	5962-8605301
PAL22V10	5962-8605302
PAL22V10-20	5962-8605304
PAL22V10-12	5962-8605305
PROG. ARRAY LOGIC 22-INPUT 10-OUPTUT AND-OR 20 NS DELAY TIME	
C22V10-20	/50803
PROG. ARRAY LOGIC 22-INPUT 10-OUTPUT AND-OR 25 NS DELAY TIME	
C22V10-25	/50802
PROG. ARRAY LOGIC AND-OR	
PAL10H8A2	/50319
PAL12H6A2	/50320
PAL14H4A2	/50321
PAL16H2A2	/50322
PROG. ARRAY LOGIC AND-OR-INVERT	
PAL16L2	5962-8103509
PAL16L2	/50309
PAL10L8A2	/50324
PAL12L6A2	/50325
PAL14L4A2	/50326
PAL16L2A2	/50327
PROG. ARRAY LOGIC AND-OR/AND-OR INVERT	
PAL16C1A2	/50323
PROG. ARRAY LOGIC AND-OR/AND-OR-INVERT	
PAL16C1A	/50314
PROG. ARRAY LOGIC ELECTR. ERASABLE 16-INPUT 8-OUTPUT AND-OR 10 NS ACCESS TIME	
16V8	5962-8983904
PROG. ARRAY LOGIC ELECTR. ERASABLE 16-INPUT 8-OUTPUT AND-OR 15 NS ACCESS TIME	
16V8A	5962-8983903
PROG. ARRAY LOGIC ELECTR. ERASABLE 16-INPUT 8-OUTPUT AND-OR 20 NS ACCESS TIME	
16V8A	5962-8983902
16V8	5962-8983906
PROG. ARRAY LOGIC ELECTR. ERASABLE 16-INPUT 8-OUTPUT AND-OR 25 NS ACCESS TIME	

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MILITARY PARTS SORTED BY FUNCTION

Industry P/N	Military* PN
16V8	5962-8983905
PROG. ARRAY LOGIC ELECTR. ERASABLE 16-INPUT 8-OUTPUT AND-OR 30 NS ACCESS TIME	
16V8A	5962-8983901
PROG. ARRAY LOGIC ELECTR. ERASABLE 20-INPUT 8-OUTPUT AND-OR 15 NS ACCESS TIME	
20V8	5962-8984003
PROG. ARRAY LOGIC ELECTR. ERASABLE 20-INPUT 8-OUTPUT AND-OR 20 NS ACCESS TIME	
20V8	5962-8984002
PROG. ARRAY LOGIC ELECTR. ERASABLE 20-INPUT 8-OUTPUT AND-OR 30 NS ACCESS TIME	
20V8	5962-8984001
PROG. ARRAY LOGIC ELECTR. ERASABLE 22-INPUT 10-OUTPUT AND-OR 15 NS ACCESS TIM	
22V10	5962-8984103
PROG. ARRAY LOGIC ELECTR. ERASABLE 22-INPUT 10-OUTPUT AND-OR 20 NS ACCESS TIM	
22V10	5962-8984102
PROG. ARRAY LOGIC ELECTR. ERASABLE 22-INPUT 10-OUTPUT AND-OR 30 NS ACCESS TIM	
22V10	5962-8984101
PROG. ARRAY LOGIC ELECTR. ERASABLE 22-INPUT 10-OUTPUT AND-OR	
22V10	5962-8984104
22V10	5962-8984105
PROG. ARRAY LOGIC ELECTRICALLY ERASABLE 600-GATE 20 NS ACCESS TIME	
610	5962-9169501
PROG. ARRAY LOGIC UV ERASABLE 16-INPUT 4-OUTPUT REGISTERED AND-OR	
C16R4-40	5962-8867804
C16R4-30	5962-8867808
C16R4-20	5962-8867812
PROG. ARRAY LOGIC UV ERASABLE 16-INPUT 6-OUTPUT REGISTERED AND-OR	
C16R6-40	5962-8867803
C16R6-30	5962-8867807
C16R6-20	5962-8867811
PROG. ARRAY LOGIC UV ERASABLE 16-INPUT 8-OUTPUT AND-OR INVERTED	
C16L8-40	5962-8867801
C16L8-30	5962-8867805
C16L8-20	5962-8867809
PROG. ARRAY LOGIC UV ERASABLE 16-INPUT 8-OUTPUT REGISTERED AND-OR	
C16R8-40	5962-8867802
C16R8-30	5962-8867806
C16R8-20	5962-8867810
PROG. ARRAY LOGIC UV ERASABLE 22-INPUT 10 OUTPUT AND-OR	
C22V10L-25	5962-8872401
PROG. ARRAY LOGIC UV ERASABLE 22-INPUT 10-OUTPUT AND-OR	
C22V10	5962-8753901
C22V10	5962-8753902
C22V10L-30	5962-8872402
C22V10L-40	5962-8872403
C22V10	5962-8753903
C22V10	5962-8753904
PROG. ARRAY LOGIC UV ERASABLE 22-INPUT 10-OUTPUT AND-OR 25 NS ACCESS TIME	
V750	5962-8872603
V750L	5962-8872607
PROG. ARRAY LOGIC UV ERASABLE 22-INPUT 10-OUTPUT AND-OR 35 NS ACCESS TIME	
V750	5962-8872602
V750L	5962-8872606
PROG. ARRAY LOGIC UV ERASABLE 22-INPUT 10-OUTPUT AND-OR 40 NS ACCESS TIME	
V750	5962-8872601
PROG. ARRAY LOGIC UV ERASABLE 22-INPUT 10-OUTPUT AND-OR	
C22V10L	5962-8872404
V750	5962-8872604
PROG. ARRAY LOGIC UV ERASABLE 300 GATE	
(SEE DWG)	5962-8863501
PROG. LOGIC ARRAY 22-INPUT 10-OUTPUT AND-OR 15 NS DELAY TIME	
C22V10-15	/50804
PROG. LOGIC ARRAY 22-INPUT 10-OUTPUT AND-OR 30 NS DELAY TIME	
C22V10-30	/50801
PROG. LOGIC DEVICE 16-INPUT 8-OUTPUT 4 NS PROP. DELAY	
10E302	5962-9057302
PROG. LOGIC DEVICE 16-INPUT 8-OUTPUT 5 NS PROP. DELAY	
10E301	5962-9057301
PROG. LOGIC DEVICE 30 NS PROP. DELAY	
20G10-30	5962-8863702
PROG. LOGIC DEVICE 40 NS PROP. DELAY	
20G10-40	5962-8863701
PROG. LOGIC DEVICE UV ERASABLE 32-MACROCELL 25 NS ACCESS TIME	
(SEE DWG)	5962-9061102
PROG. LOGIC DEVICE UV ERASABLE 32-MACROCELL 35 NS ACCESS TIME	
(SEE DWG)	5962-9061101
PROG. LOGIC DEVICE UV ERASABLE 75 NS ACCESS TIME	
(SEE DWG)	5962-8854902
PROG. LOGIC DEVICE UV ERASEABLE 128-MACROCELL 35 NS DELAY TIME	
(SEE DWG)	5962-8946801
PROGRAMMABLE ARRAY 2000 GATE 8 X 8 50 MHZ	
3020	5962-8994801
PROGRAMMABLE ARRAY 2000 GATE 8 X 8 70 MHZ	
3020	5962-8994802
PROGRAMMABLE ARRAY 4200 GATE 12 X 12 50 MHZ	
3042	5962-8971301
PROGRAMMABLE ARRAY 4200 GATE 12 X 12 70 MHZ	
3042	5962-8971302
PROGRAMMABLE ARRAY 9000-GATE 16X20 50 MHZ TOGGLE SPEED	
3090-50	5962-8982301
PROGRAMMABLE ARRAY 9000-GATE 16X20 70 MHZ TOGGLE SPEED	
3090-70	5962-8982302
PROGRAMMABLE LOGIC DEVICE ASYNCHRONOUS 20 NS	
(SEE DWG)	5962-9055503
PROGRAMMABLE LOGIC DEVICE ASYNCHRONOUS 25 NS	
(SEE DWG)	5962-9055502
PROGRAMMABLE LOGIC DEVICE ASYNCHRONOUS 35 NS	
(SEE DWG)	5962-9055501
PROGRAMMABLE LOGIC DEVICE ERASABLE 900-GATE	
(SEE DWG)	5962-8854801
PROGRAMMABLE LOGIC DEVICE ONE-TIME PROGRAMMABLE ASYNCHRONOUS REGISTERED 25 NS	
CY7C331-25	5962-8985503
PROGRAMMABLE LOGIC DEVICE ONE-TIME PROGRAMMABLE ASYNCHRONOUS REGISTERED 30 NS	
CY7C331-30	5962-8985502
PROGRAMMABLE LOGIC DEVICE ONE-TIME PROGRAMMABLE ASYNCHRONOUS REGISTERED 40 NS	
CY7C331-40	5962-8985501
PROGRAMMABLE LOGIC DEVICE UV ERASABLE ASYNCHRONOUS REGISTERED 25 NS ACCESS	
(SEE DWG)	5962-9075403
PROGRAMMABLE LOGIC DEVICE UV ERASABLE ASYNCHRONOUS REGISTERED 30 NS ACCESS	
(SEE DWG)	5962-9075402
PROGRAMMABLE LOGIC DEVICE UV ERASABLE ASYNCHRONOUS REGISTERED 40 NS ACCESS	
(SEE DWG)	5962-9075401
PROGRAMMABLE SYNCHRONOUS STATE MACHINE 28 MHZ	
(SEE DWG)	5962-8954601
PROGRAMMABLE SYNCHRONOUS STATE MACHINE 50 MHZ	
(SEE DWG)	5962-8954603
PROGRAMMABLE SYNCHRONOUS STATE MACHING 40 MHZ	
(SEE DWG)	5962-8954602
PROM 1K X 4	
7644	/20603
PROM 1K X 4 WITH OPEN-COLLECTOR OUTPUTS	
53S440	/20601
PROM 1K X 4 WITH THREE-STATE OUTPUTS	
53S441	/20602
82S137A	/20604
PROM 1K X 8 POWER SWITCHED 75 NS ACCESS TIME	
(SEE DWG)	5962-7902402
PROM 1K X 8 POWER SWITCHED 90 NS ACCESS TIME	
(SEE DWG)	5962-7902401
PROM 1K X 8 WITH OPEN-COLLECTOR OUTPUTS 90 NS ACCESS TIME	
27S180	/20903
93Z460	/20906
PROM 1K X 8 WITH THREE-STATE OUTPUTS 45 NS ACCESS TIME	
(SEE DWG)	5962-8765101
PROM 1K X 8 WITH THREE-STATE OUTPUTS 55 NS ACCESS TIME	
82S181A	/20909
PROM 1K X 8 WITH THREE-STATE OUTPUTS 90 NS ACCESS TIME	
27S181	/20904
82S2708	/20905
PROM 256 X 4	
IM5603A	/20201
IM5623	/20202
PROM 256 X 4 WITH OPEN-COLLECTOR OUTPUTS	
5300-1	/20301
82S126A	/20303
PROM 256 X 4 WITH THREE-STATE OUTPUTS	
5301-1	/20302
PROM 256 X 4 WITH THREE-STATE OUTPUTS 40 NS ACCESS TIME	
82S129A	5962-8778802
PROM 256 X 4 WITH THREE-STATE OUTPUTS 60 NS ACCESS TIME	
82S129A	5962-8778801
82S129A	/20304
PROM 2K X 4 WITH OPEN-	

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MILITARY PARTS
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Industry P/N	Military* PN
COLLECTOR OUTPUTS 125 NS ACCESS TIME	
7684	/20901
PROM 2K X 4 WITH THREE-STATE OUTPUTS 125 NS ACCESS TIME	
29651	/20902
PROM 2K X 4 WITH THREE-STATE OUTPUTS 55 NS ACCESS TIME	
82S185A	/20910
PROM 2K X 4 WITH THREE-STATE OUTPUTS 90 NS ACCESS TIME	
29651	/20908
PROM 2K X 8 105 NS ACCESS TIME	
(SEE DWG)	5962-8954002
PROM 2K X 8 140 NS ACCESS TIME	
(SEE DWG)	5962-8954001
PROM 2K X 8 25 NS ACCESS TIME	
(SEE DWG)	5962-8873404
PROM 2K X 8 35 NS ACCESS TIME	
(SEE DWG)	5962-8873403
PROM 2K X 8 45 NS ACCESS TIME	
(SEE DWG)	5962-8873402
PROM 2K X 8 55 NS ACCESS TIME	
(SEE DWG)	5962-8873401
PROM 2K X 8 WITH OPEN-COLLECTOR OUTPUTS	
53S1680	/21001
93Z510	/21003
PROM 2K X 8 WITH THREE-STATE OUTPUTS	
27S191	/21002
28S166A	/21004
PROM 32 X 8 WITH OPEN-COLLECTOR OUTPUTS	
5330	/20701
82S23A	/20703
PROM 32 X 8 WITH THREE-STATE OUTPUTS	
5331	/20702
82S123A	/20704
PROM 32 X 8 WITH THREE-STATE OUTPUTS 35 NS ACCESS TIME	
27S19A	5962-8670302
PROM 32 X 8 WITH THREE-STATE OUTPUTS 50 NS ACCESS TIME	
27S19	5962-8670301
PROM 4K X 4 WITH THREE-STATE OUTPUTS	
76165	/21005
PROM 4K X 8 TS 40 NS ACCESS TIME	
(SEE DWG)	5962-8200803
PROM 4K X 8 TS 70 NS ACCESS TIME	
(SEE DWG)	5962-8200804
29671	/21103
PROM 4K X 8 WITH THREE-STATE OUTPUTS 55 NS ACCESS TIME	
(SEE DWG)	5962-8200802
82HS321A	/21101
PROM 4K X 8 WITH THREE-STATE OUTPUTS 95 NS ACCESS TIME	
(SEE DWG)	5962-8200801
29671	/21102
PROM 512 X 4 THREE-STATE 40 NS ACCESS TIME	
27S13A	5962-8854101
PROM 512 X 4 THREE-STATE 60 NS ACCESS TIME	
27S13	5962-8854102
PROM 512 X 4 WITH OPEN-COLLECTOR OUTPUTS	
5305-1	/20401
82S130A	/20403
PROM 512 X 4 WITH THREE-STATE OUTPUTS	
29611	/20402
82S131A	/20404
PROM 512 X 8 REGISTERED 30 NS ACCESS TIME	
(SEE DWG)	5962-8851801
PROM 512 X 8 140 NS ACCESS TIME	
(SEE DWG)	5962-8869002
PROM 512 X 8 220 NS ACCESS TIME	
(SEE DWG)	5962-8869001
PROM 512 X 8 REGISTERED 35 NS ACCESS TIME	
(SEE DWG)	5962-8851802
PROM 512 X 8 REGISTERED 40 NS ACCESS TIME	
(SEE DWG)	5962-8851803
PROM 512 X 8 THREE-STATE 45 NS ACCESS TIME	
(SEE DWG)	5962-7801602
PROM 512 X 8 WITH OPEN-COLLECTOR OUTPUTS	
7640	/20801
5348-1	/20804
PROM 512 X 8 WITH THREE-STATE OUTPUTS	
82S115	/20803
29621	/20805
PROM 512 X 8 WITH THREE-STATE OUTPUTS 45 NS ACCESS TIME	
27S29A	5962-8769002
PROM 512 X 8 WITH THREE-STATE OUTPUTS 70 NS ACCESS TIME	
27S29	5962-8769001
PROM 512 X 8 WITH THREE-STATE OUTPUTS 90 NS ACCESS TIME	
(SEE DWG)	5962-7801601
5341-1	/20802
PROM 64 X 8	
MCM5304	/20102
PROM 64 X 8 WITH OPEN-COLLECTOR OUTPUTS	
HPROM-512	/20101
PROM 8K X 8 25 NS ACCESS TIME	
(SEE DWG)	5962-9080304
(SEE DWG)	5962-9080308
PROM 8K X 8 35 NS ACCESS TIME	
(SEE DWG)	5962-9080303
(SEE DWG)	5962-9080307
PROM 8K X 8 45 NS ACCESS TIME	
(SEE DWG)	5962-9080302
(SEE DWG)	5962-9080306
PROM 8K X 8 55 NS ACCESS TIME	
(SEE DWG)	5962-9080301
(SEE DWG)	5962-9080305
PROM 8K X 8 TS 100 NS ACCESS TIME	
(SEE DWG)	5962-8200901
PROM 8K X 8 TS 45 NS ACCESS TIME	
(SEE DWG)	5962-8200903
PROM 8K X 8 WITH THREE-STATE OUTPUTS	
82HS641A-70	/21201
93Z665-50	/21203
PROM 8K X 8 WITH THREE-STATE OUTPUTS 55 NS ACCESS TIME	
(SEE DWG)	5962-8200902
93Z665-55	/21202
82HS641A-45	/21204
PROM ELECTR. ERASABLE 256 X 16	
93CS66	5962-9154901
PROM ELECTR. ERASABLE 512 X 8	
(SEE DWG)	5962-8959001
PROM UV ERASABLE 512 X 8	
6654	/21901
PROM UV ERASABLE 1K X 8	
2708	/22001
PROM ELECTR. ERASABLE 2K X 8	
(SEE DWG)	5962-8966701
NMC2816	/22601
X2816A-45	/22701
X2816A-35	/22702
X2816A-30	/22703
X2816A-25	/22704
PROM ELECTR. ERASABLE 2K X 8 55 NS ACCESS TIME	
(SEE DWG)	5962-8867603
PROM ELECTR. ERASABLE 2K X 8 70 NS ACCESS TIME	
(SEE DWG)	5962-8867602
PROM ELECTR. ERASABLE 2K X 8 90 NS ACCESS TIME	
(SEE DWG)	5962-8867601
PROM UV ERASABLE 2K X 8 REGISTERED 35 NS ACCESS TIME	
(SEE DWG)	5962-8873502
PROM UV ERASABLE 2K X 8 REGISTERED 45 NS ACCESS TIME	
(SEE DWG)	5962-8873501
PROM UV ERASABLE 2K X 8 150 NS ACCESS TIME	
(SEE DWG)	5962-7802205
PROM UV ERASABLE 2K X 8 200 NS ACCESS TIME	
(SEE DWG)	5962-7802206
PROM UV ERASABLE 2K X 8 250 NS ACCESS TIME	
(SEE DWG)	5962-7802207
PROM UV ERASABLE 2K X 8 300 NS ACCESS TIME	
(SEE DWG)	5962-7802208
PROM UV ERASABLE 2K X 8 35 NS ACCESS TIME	
(SEE DWG)	5962-8765003
PROM UV ERASABLE 2K X 8 350 NS ACCESS TIME	
(SEE DWG)	5962-7802203
(SEE DWG)	5962-7802204
PROM UV ERASABLE 2K X 8 45 NS ACCESS TIME	
(SEE DWG)	5962-8765004
PROM UV ERASABLE 2K X 8 450 NS ACCESS TIME	
(SEE DWG)	5962-7802201
(SEE DWG)	5962-7802202
(SEE DWG)	5962-7802209
2716	/22101
PROM UV ERASABLE 2K X 8 50 NS ACCESS TIME	
(SEE DWG)	5962-8765001
PROM UV ERASABLE 2K X 8 55 NS ACCESS TIME	
(SEE DWG)	5962-8765002
PROM UV ERASABLE 2K X 8 POWER DOWN 25 NS SETUP TIME	
(SEE DWG)	5962-8868004
PROM UV ERASABLE 2K X 8 POWER DOWN 30 NS SETUP TIME	
(SEE DWG)	5962-8868003
PROM UV ERASABLE 2K X 8 POWER DOWN 35 NS SETUP TIME	
(SEE DWG)	5962-8868002

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MILITARY PARTS SORTED BY FUNCTION

Industry P/N	Military* PN
PROM UV ERASABLE 2K X 8 POWER DOWN 50 NS SETUP TIME	
(SEE DWG)	5962-8868001
PROM UV ERASABLE 2K X 8 REGISTERED 18 NS ACCESS TIME	
(SEE DWG)	5962-8981503
PROM UV ERASABLE 2K X 8 REGISTERED 25 NS ACCESS TIME	
(SEE DWG)	5962-8981502
(SEE DWG)	5962-8873504
PROM UV ERASABLE 2K X 8 REGISTERED 35 NS ACCESS TIME	
(SEE DWG)	5962-8981501
(SEE DWG)	5962-8873503
PROM UV ERASABLE 4K X 8	
2532	/22201
PROM UV ERASABLE 4K X 8 35 NS ACCESS TIME	
57C43C-35	5962-9065804
PROM UV ERASABLE 4K X 8 45 NS ACCESS TIME	
57C43C-45	5962-9065803
PROM UV ERASABLE 4K X 8 55 NS ACCESS TIME	
57C43C-55	5962-9065802
PROM UV ERASABLE 4K X 8 70 NS ACCESS TIME	
57C43C-70	5962-9065801
PROM UV ERASABLE 4K X 8 150 NS ACCESS TIME	
(SEE DWG)	5962-8001207
PROM UV ERASABLE 4K X 8 200 NS ACCESS TIME	
(SEE DWG)	5962-8001208
PROM UV ERASABLE 4K X 8 250 NS ACCESS TIME	
(SEE DWG)	5962-8001203
(SEE DWG)	5962-8001209
PROM UV ERASABLE 4K X 8 300 NS ACCESS TIME	
(SEE DWG)	5962-8001210
PROM UV ERASABLE 4K X 8 350 NS ACCESS TIME	
(SEE DWG)	5962-8001205
PROM UV ERASABLE 4K X 8 450 NS ACCESS TIME	
(SEE DWG)	5962-8001201
(SEE DWG)	5962-8001202
(SEE DWG)	5962-8001204
(SEE DWG)	5962-8001206
(SEE DWG)	5962-8001211
PROM ELECTR. ERASABLE 8K X 8 70 NS ACCESS TIME	
(SEE DWG)	5962-8751412
PROM ELECTR. ERASABLE 8K X 8 90 NS ACCESS TIME	
(SEE DWG)	5962-8751411
PROM ELECTR. ERASABLE 8K X 8 120 NS ACCESS TIME	
(SEE DWG)	5962-8751410
PROM ELECTR. ERASABLE 8K X 8 150 NS ACCESS TIME	
(SEE DWG)	5962-8751417
(SEE DWG)	5962-8751422
PROM ELECTR. ERASABLE 8K X 8 200 NS ACCESS TIME	
28C64-200	/26004
(SEE DWG)	5962-8751404
(SEE DWG)	5962-8751409
(SEE DWG)	5962-8751416
(SEE DWG)	5962-8751421
(SEE DWG)	5962-8751426
PROM ELECTR. ERASABLE 8K X 8 250 NS ACCESS TIME	
(SEE DWG)	5962-8683001
(SEE DWG)	5962-8751403
28C64-250	/26003
(SEE DWG)	5962-8683004
(SEE DWG)	5962-8683005
55C64-250	/26005
(SEE DWG)	5962-8751405
(SEE DWG)	5962-8683006
28C65-250	/26006
(SEE DWG)	5962-8683008
(SEE DWG)	5962-8751408
(SEE DWG)	5962-8751415
(SEE DWG)	5962-8751420
(SEE DWG)	5962-8751425
(SEE DWG)	5962-8751427
X2864A-25	/22804
X2864A-25	/22806
2864-250	/22808
2864H-250	/22809
5564-250	/22810
5564-250	/22811
PROM ELECTR. ERASABLE 8K X 8 300 NS ACCESS TIME	
28C64-300	/26002
(SEE DWG)	5962-8751402
(SEE DWG)	5962-8683003
(SEE DWG)	5962-8751407
(SEE DWG)	5962-8683009
(SEE DWG)	5962-8751414
(SEE DWG)	5962-8751419
(SEE DWG)	5962-8751424
X2864A-30	/22803
PROM ELECTR. ERASABLE 8K X 8 350 NS ACCESS TIME	
28C64-350	/26001
(SEE DWG)	5962-8751401
(SEE DWG)	5962-8683002
(SEE DWG)	5962-8751406
28C65-350	/26007
(SEE DWG)	5962-8683007
(SEE DWG)	5962-8683010
(SEE DWG)	5962-8751413
(SEE DWG)	5962-8751418
(SEE DWG)	5962-8751423
X2864A-35	/22802
X2864A-35	/22805
2864-350	/22807
PROM ELECTR. ERASABLE 8K X 8 450 NS ACCESS TIME	
X2864A-45	/22801
PROM UV ERASABLE 8K X 8 120 NS ACCESS TIME	
27C64-12	5962-8510205
PROM UV ERASABLE 8K X 8 150 NS ACCESS TIME	
2764-150	5962-8200506
27C64-15	5962-8510206
PROM UV ERASABLE 8K X 8 200 NS ACCESS TIME	
27C64-20	5962-8510203
2764A-20	5962-8200505
2764-200	5962-8200507
27C64-200	/27503
PROM UV ERASABLE 8K X 8 250 NS ACCESS TIME	
27C64-25	5962-8510201
2764-250	5962-8200502
2764A-25	5962-8200504
27C64-250	/27502
PROM UV ERASABLE 8K X 8 350 NS ACCESS TIME	
27C64-35	5962-8510202
2764A-35	5962-8200503
27C64-350	/27501
PROM UV ERASABLE 8K X 8 45 NS ACCESS TIME	
(SEE DWG)	5962-8751501
(SEE DWG)	5962-8751505
PROM UV ERASABLE 8K X 8 450 NS ACCESS TIME	
2764-450	5962-8200501
PROM UV ERASABLE 8K X 8 55 NS ACCESS TIME	
(SEE DWG)	5962-8751502
27HC64-155	/27402
(SEE DWG)	5962-8751506
PROM UV ERASABLE 8K X 8 70 NS ACCESS TIME	
57C64-70	5962-8510207
(SEE DWG)	5962-8751503
27HC64-170	/27401
PROM UV ERASABLE 8K X 8 90 NS ACCESS TIME	
27C64-90	5962-8510204
(SEE DWG)	5962-8751504
PROM UV ERASABLE 16K X 8 100 NS ACCESS TIME	
(SEE DWG)	5962-8202507
PROM UV ERASABLE 16K X 8 120 NS ACCESS TIME	
(SEE DWG)	5962-8766102
PROM UV ERASABLE 16K X 8 150 NS ACCESS TIME	
(SEE DWG)	5962-8766103
PROM UV ERASABLE 16K X 8 170 NS ACCESS TIME	
(SEE DWG)	5962-8766104
PROM UV ERASABLE 16K X 8 200 NS ACCESS TIME	
(SEE DWG)	5962-8202503
(SEE DWG)	5962-8766105
(SEE DWG)	5962-8202508
PROM UV ERASABLE 16K X 8 250 NS ACCESS TIME	
(SEE DWG)	5962-8202502
(SEE DWG)	5962-8202505
(SEE DWG)	5962-8766106
PROM UV ERASABLE 16K X 8 300 NS ACCESS TIME	
(SEE DWG)	5962-8202504
(SEE DWG)	5962-8766107
(SEE DWG)	5962-8202509
PROM UV ERASABLE 16K X 8 450 NS ACCESS TIME	
(SEE DWG)	5962-8202501
PROM UV ERASABLE 16K X 8 55 NS ACCESS TIME	
(SEE DWG)	5962-8953702
(SEE DWG)	5962-8953802
PROM UV ERASABLE 16K X 8 65 NS ACCESS TIME	
(SEE DWG)	5962-8953701
(SEE DWG)	5962-8953801
PROM UV ERASABLE 16K X 8 70 NS ACCESS TIME	
(SEE DWG)	5962-8766108
PROM UV ERASABLE 16K X 8 90 NS ACCESS TIME	
(SEE DWG)	5962-8766101
PROM UV ERASABLE 16K X 8 TS 150 NS ACCESS TIME	
(SEE DWG)	5962-8202506
PROM ELECTR. ERASABLE 32K X 8 90 NS ACCESS TIME	
(SEE DWG)	5962-8863403
(SEE DWG)	5962-8863404
PROM ELECTR. ERASABLE 32K X 8 120 NS ACCESS TIME	
(SEE DWG)	5962-8863401
(SEE DWG)	5962-8863402
PROM ELECTR. ERASABLE 32K X 8 150 NS ACCESS TIME	
(SEE DWG)	5962-8852506
(SEE DWG)	5962-8852507
28C256-150	/26105
28C256-150	/26111
PROM ELECTR. ERASABLE 32K X 8 200 NS ACCESS TIME	
(SEE DWG)	5962-8852504
28C256-200	/26104
28C256-200	/26110
PROM ELECTR. ERASABLE 32K X 8 250 NS ACCESS TIME	
(SEE DWG)	5962-8852503
(SEE DWG)	5962-8852505
(SEE DWG)	5962-8764903
28C256-250	/26103
28C256-250	/26106
28C256-250	/26109
28C256-250	/26112
PROM ELECTR. ERASABLE 32K X 8 300 NS ACCESS TIME	
(SEE DWG)	5962-8852502
(SEE DWG)	5962-8764902
28C256-300	/26102
28C256-300	/26108
PROM ELECTR. ERASABLE 32K X 8 350 NS ACCESS TIME	

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MILITARY PARTS SORTED BY FUNCTION

Industry P/N	Military* PN
(SEE DWG)	5962-8852501
(SEE DWG)	5962-8764901
28C256-350	/26101
28C256-350	/26107
PROM UV ERASABLE 32K X 8	
27C256-200	/27602
PROM UV ERASABLE 32K X 8 45 NS ACCESS TIME	
(SEE DWG)	5962-8981702
PROM UV ERASABLE 32K X 8 55 NS ACCESS TIME	
(SEE DWG)	5962-8981701
PROM UV ERASABLE 32K X 8 70 NS ACCESS TIME	
(SEE DWG)	5962-8606308
PROM UV ERASABLE 32K X 8 90 NS ACCESS TIME	
(SEE DWG)	5962-8606307
PROM UV ERASABLE 32K X 8 120 NS ACCESS TIME	
(SEE DWG)	5962-8606306
PROM UV ERASABLE 32K X 8 150 NS ACCESS TIME	
(SEE DWG)	5962-8606305
PROM UV ERASABLE 32K X 8 170 NS ACCESS TIME	
(SEE DWG)	5962-8606304
27256-170	5962-8411104
27256-170	/22403
PROM UV ERASABLE 32K X 8 200 NS ACCESS TIME	
(SEE DWG)	5962-8606301
27256-200	5962-8411103
27256-200	/22402
PROM UV ERASABLE 32K X 8 250 NS ACCESS TIME	
27256-250	5962-8411102
(SEE DWG)	5962-8606302
27C256-250	/27601
27256-250	/22401
PROM UV ERASABLE 32K X 8 300 NS ACCESS TIME	
(SEE DWG)	5962-8606303
27256-30	5962-8411105
PROM UV ERASABLE 32K X 8 350 NS ACCESS TIME	
27256-35	5962-8411101
PROM ELECTR. ERASABLE 64K X 8 120 NS ACCESS TIME	
28C512	5962-9086907
28C512	5962-9086908
28C513	5962-9086915
28C513	5962-9086916
(SEE SPEC)	/26509
(SEE SPEC)	/26510
PROM ELECTR. ERASABLE 64K X 8 150 NS ACCESS TIME	
28C512	5962-9086905
28C512	5962-9086906
28C513	5962-9086913
28C513	5962-9086914
(SEE SPEC)	/26507
(SEE SPEC)	/26508
PROM ELECTR. ERASABLE 64K X 8 200 NS ACCESS TIME	
28C512	5962-9086903
28C512	5962-9086904
28C513	5962-9086911
28C513	5962-9086912
(SEE SPEC)	/26505
(SEE SPEC)	/26506
PROM ELECTR. ERASABLE 64K X 8 250 NS ACCESS TIME	
28C512	5962-9086901
28C512	5962-9086902
28C513	5962-9086909
28C513	5962-9086910
(SEE SPEC)	/26503
(SEE SPEC)	/26504
PROM ELECTR. ERASABLE 64K X 8 300 NS ACCESS TIME	
(SEE SPEC)	/26501
(SEE SPEC)	/26502
PROM UV ERASABLE 64K X 16 70 NS ACCESS TIME	
(SEE DWG)	5962-8680508
PROM UV ERASABLE 64K X 16 90 NS ACCESS TIME	
(SEE DWG)	5962-8680507
PROM UV ERASABLE 64K X 16 120 NS ACCESS TIME	
(SEE DWG)	5962-8680506
PROM UV ERASABLE 64K X 16 150 NS ACCESS TIME	
(SEE DWG)	5962-8680505
PROM UV ERASABLE 64K X 16 170 NS ACCESS TIME	
(SEE DWG)	5962-8680504
PROM UV ERASABLE 64K X 16 200 NS ACCESS TIME	
(SEE DWG)	5962-8774401
(SEE DWG)	5962-8680503
PROM UV ERASABLE 64K X 16 250 NS ACCESS TIME	
(SEE DWG)	5962-8774402
(SEE DWG)	5962-8680502
PROM UV ERASABLE 64K X 16 300 NS ACCESS TIME	
(SEE DWG)	5962-8680501
PROM UV ERASABLE 64K X 8 120 NS ACCESS TIME	
27C512	5962-8764804
PROM UV ERASABLE 64K X 8 150 NS ACCESS TIME	
27C512	5962-8764801
PROM UV ERASABLE 64K X 8 200 NS ACCESS TIME	
27C512	5962-8764802
27512-20	5962-8513505
PROM UV ERASABLE 64K X 8 250 NS ACCESS TIME	
27512-25	5962-8513501
27C512	5962-8764803
PROM UV ERASABLE 64K X 8 300 NS ACCESS TIME	
27512-30	5962-8513503
PROM UV ERASABLE 64K X 8 350 NS ACCESS TIME	
27512-35	5962-8513502
PROM UV ERASABLE 64K X 8 450 NS ACCESS TIME	
27512-45	5962-8513504
PROM ELECTR. ERASABLE 128K X 8 120 NS ACCESS TIME	
28F010	5962-9089904
28C010	5962-3826707
28F010	5962-9089908
PROM ELECTR. ERASABLE 128K X 8 150 NS ACCESS TIME	
28F010	5962-9089903
28C010	5962-3826705
28C010	5962-3826706
28F010	5962-9089907
PROM ELECTR. ERASABLE 128K X 8 200 NS ACCESS TIME	
28F010	5962-9089902
28C010	5962-3826703
28C010	5962-3826704
28F010	5962-9089906
PROM ELECTR. ERASABLE 128K X 8 250 NS ACCESS TIME	
28C010	5962-3826701
28F010	5962-9089901
28C010	5962-3826702
28F010	5962-9089905
PROM UV ERASABLE 128K X 8 55 NS ACCESS TIME	
(SEE DWG)	5962-8961409
PROM UV ERASABLE 128K X 8 70 NS ACCESS TIME	
(SEE DWG)	5962-8961408
PROM UV ERASABLE 128K X 8 90 NS ACCESS TIME	
(SEE DWG)	5962-8961407
PROM UV ERASABLE 128K X 8 120 NS ACCESS TIME	
(SEE DWG)	5962-8961406
PROM UV ERASABLE 128K X 8 150 NS ACCESS TIME	
(SEE DWG)	5962-8961405
PROM UV ERASABLE 128K X 8 170 NS ACCESS TIME	
(SEE DWG)	5962-8961404
PROM UV ERASABLE 128K X 8 200 NS ACCESS TIME	
(SEE DWG)	5962-8961403
PROM UV ERASABLE 128K X 8 250 NS ACCESS TIME	
(SEE DWG)	5962-8961402
PROM UV ERASABLE 128K X 8 300 NS ACCESS TIME	
(SEE DWG)	5962-8961401
PROM 8K X 8 TS 45 NS ACCESS TIME	
(SEE DWG)	5962-8200903
PROM 8K X 8 TS 100 NS ACCESS TIME	
(SEE DWG)	5962-8200901
PROM 8K X 8 WITH THREE-STATE OUTPUTS	
82HS641A-70	/21201
93Z665-50	/21203
PROM 8K X 8 WITH THREE-STATE OUTPUTS 55 NS ACCESS TIME	
(SEE DWG)	5962-8200902
93Z665-55	/21202
82HS641A-45	/21204
PROM POWER-SWITCHED 2K X 8 (THREE-STATE) 65 NS ACCESS TIME	
27PS191A	5962-8552602
27PS291A	5962-8552604
PROM POWER-SWITCHED 2K X 8 (THREE-STATE) 75 NS ACCESS TIME	
27PS191	5962-8552601
27PS291	5962-8552603
PROM REGISTERED UV ERASABLE 2K X 8 35 NS SETUP TIME	
(SEE DWG)	5962-8752902
PROM REGISTERED UV ERASABLE 2K X 8 45 NS SETUP TIME	
(SEE DWG)	5962-8752901
PROM REGISTERED 1K X 8 30 NS ACCESS TIME	
7C235-30	5962-8863602
PROM REGISTERED 1K X 8 40 NS ACCESS TIME	
7C235-40	5962-8863601
PROM REGISTERED 1K X 8 WITH PROGRAMMABLE INITIALIZE ((ASYNCHRONOUS)	
27S35A	5962-8670602
PROM REGISTERED 1K X 8 WITH PROGRAMMABLE INITIALIZE (ASYNCHRONOUS)	
27S35	5962-8670601
PROM REGISTERED 1K X 8 WITH PROGRAMMABLE INITIALIZE (SYNCHRONOUS)	

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MILITARY PARTS SORTED BY FUNCTION

Industry P/N	Military* PN
27S37	5962-8670603
27S37A	5962-8670604
PROM REGISTERED 2K X 8 WITH PROGRAMMABLE INITIALIZE (ASYNCHRONOUS)	
27S45	5962-8552701
27S45A	5962-8552702
PROM REGISTERED 2K X 8 WITH PROGRAMMABLE INITIALIZE (SYNCHRONOUS)	
27S47	5962-8552703
27S47A	5962-8552704
STATIC ROM 512 X 8	
1832	/47201
STATIC ROM 2K X 8 WITH THREE-STATE OUTPUTS	
34000	/40301

Microprocessors and interface peripherals/FIFO 8/

Industry P/N	Military* PN
ADDRESS GENERATOR	
TVB382	/61601
BUS ARBITER 8 MHZ	
82C89	5962-8552801
BUS CONTROLLER	
M82C288-6	5962-9099701
M82C288-8	5962-9099702
M82C288-10	5962-9099703
BUS CONTROLLER 6 MHZ	
82288-6	5962-8514901
BUS CONTROLLER 8 MHZ	
82C88	5962-8406901
82288-8	5962-8514902
BUS CONTROLLER INTEGRATED	
82188	5962-8767201
BUS CONTROLLER REMOTE TERMINAL	
UT1553BB	5962-8862801
BUS CONTROLLER REMOTE TERMINAL AND MONITOR	
UT1553BBCRTM	5962-8957701
BUS CONTROLLER SCSI 2 MHZ	
L5380	5962-9054801
L53C80	5962-9054802
BUS INTERFACE LATCH 8-BIT NONINVERTING TTL-COMPATIBLE	
54FCT845A	5962-8867501
54FCT845B	5962-8867502
CLOCK GENERATOR AND CONTROLLER 10 MHZ	
Z0858110	5962-8752601
CLOCK GENERATOR AND CONTROLLER 6.0 MHZ	
Z0858106	5962-8752602
CLOCK GENERATOR AND READY INTERFACE 6 MHZ	
82C284-6	5962-8773403
CLOCK GENERATOR AND READY INTERFACE 8 MHZ	
82C284-8	5962-8773402
CLOCK GENERATOR AND RESET INTERFACE 12.5 MHZ	
82384-12	5962-8766902
CLOCK GENERATOR AND READY INTERFACE 10 MHZ	
82C284-10	5962-8773401
CLOCK GENERATOR AND RESET INTERFACE 16 MHZ	
82384-16	5962-8766901
CLOCK GENERATOR 31 MHZ	
2925	5962-8859801
CLOCK GENERATOR 50 MHZ	
2925A	5962-8859802
CLOCK REAL-TIME MICROPROCESSOR-COMPATIBLE	
ICM7170	5962-8765301
COMMUNICATION CONTROLLER SERIAL WITH SDLC ENHANCEMENTS 8.0 MHZ	
AM85C30-8	5962-8868906
COMMUNICATION INTERFACE PROGRAMMABLE	
8251A	5962-8754801
8251A	5962-8754802
COMMUNICATIONS CONTROLLER SERIAL 4.0 MHZ	
Z0853004	5962-8752702
Z8030	5962-8551802
COMMUNICATIONS CONTROLLER SERIAL 6.0 MHZ	
Z85C3006	5962-8868901
Z0853006	5962-8752701
Z8030A	5962-8551801
Z85C3006SCC	/48601
COMMUNICATIONS CONTROLLER SERIAL 8.0 MHZ	
Z85C3008	5962-8868902
85C3008SCC	/48602
COMMUNICATIONS CONTROLLER SERIAL 16.0 MHZ	
Z85C3010	5962-8868907
COMMUNICATIONS CONTROLLER SERIAL WITH SDLC ENHANCEMENTS 10.0 MHZ	
AM85C30-10	5962-8868903
Z8523010	5962-8868908
COMMUNICATIONS CONTROLLER SERIAL WITH SDLC ENHANCEMENTS 12.0 MHZ	
AM85C30-12	5962-8868904
COMMUNICATIONS CONTROLLER SERIAL WITH SDLC ENHANCEMENTS 16.0 MHZ	
AM85C30-16	5962-8868905
Z8523016	5962-8868909
COMMUNICATIONS CONTROLLER SERIAL WITH SDLC ENHANCEMENTS 8.0 MHZ	
Z8523008	5962-8868910
COMMUNICATIONS CONTROLLER UNIVERSAL SERIAL DUAL	
68562	5962-8681001
CONTROL UNIT STATUS AND SHIFT 4-BIT	
2904	5962-8601701
CONTROLLER INTERFACE SERIAL 16 MHZ	
82C52	5962-8501501
CONTROLLER 8-BIT HIGH PERFORMANCE WITH 16K BYTES PROGR. EPROM	
87C51FB-12	5962-9056401
87C51FB-16	5962-9056402
CONTROLLER ASYNCHRONOUS SERIAL	
82510	5962-8972501
CONTROLLER DUAL SERIAL INPUT/OUTPUT 2.5 MHZ	
Z8442	5962-8301502
CONTROLLER DUAL SERIAL INPUT/OUTPUT 4.0 MHZ	
Z8442A	5962-8301501
CONTROLLER GPIB	
9914A	5962-8751901
CONTROLLER I/O	
Z80ASIO/2	/48101
CONTROLLER MICROPROGRAM	
2910	5962-7801701
2910A	5962-7801702
CONTROLLER MICROPROGRAM (9 DEEP STACK)	
29C10A	5962-8770801
CONTROLLER MICROPROGRAM (17 DEEP STACK)	
7C910-51	5962-8770804
7C910-46	5962-8770805
CONTROLLER MICROPROGRAM (33 DEEP STACK)	
39C10B	5962-8770802
39C10C	5962-8770803
CONTROLLER MULTI-PROTOCOL SERIAL	
8274	5962-8771301
CONTROLLER SERIAL COMMUNICATION	
1HK84	5962H92A0101
CONTROLLER VMEBUS	
68172	5962-8770501
CONTROLLER/BUS DRIVER	
8228	/42301
COPROCESSOR FLOATING POINT 16 MHZ	
68882-16	5962-8946301
COPROCESSOR FLOATING POINT 20 MHZ	
68882-20	5962-8946302
COPROCESSOR FLOATING POINT 25 MHZ	
68882-25	5962-8946303
COPROCESSOR FLOATING POINT 33 MHZ	
68882-33	5962-8946304
COPROCESSOR FLOATING-POINT	
68881-16	5962-8602102
68881-20	5962-8602103
COUNTER/TIMER AND PARALLEL I/O PERIPHERAL UNIT	
Z8536	5962-8300101
Z8536A	5962-8300102
COUNTER/TIMER AND PARALLEL I/O UNIT 4.0 MHZ	
Z8036	5962-8551702
COUNTER/TIMER AND PARALLEL I/O UNIT 6.0 MHZ	
Z8036A	5962-8551701
COUNTER/TIMER UNIT 2.5 MHZ	
Z8430	5962-8301602
Z80CTC	/48302
COUNTER/TIMER UNIT 4.0 MHZ	
Z8430A	5962-8301601
Z80ACTC	/48301
COUNTER/TIMER UNIT 6.17 MHZ	
Z84C3006	5962-8951501
DATA ACQUISITION SYSTEM 10-BIT	

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MILITARY PARTS SORTED BY FUNCTION

Industry P/N	Military* PN
LTC1090	5962-8983001
DATA ACQUISITION SYSTEM 12-BIT 8 CHANNEL	
MN7140	5962-9079701
DATA PROCESSOR NUMERIC 5 MHZ	
8087	5962-8854702
DATA PROCESSOR NUMERIC 8 MHZ	
8087-2	5962-8854701
DIGITAL SIGNAL PROCESSOR 25 MHZ	
320C30	5962-9052602
DIGITAL SIGNAL PROCESSOR 28 MHZ	
320C30	5962-9052601
DIGITAL SIGNAL PROCESSOR 56-BIT GENERAL PURPOSE	
56001-20	5962-8951201
DISPLAY CONTROLLER GRAPHICS	
82720	5962-8608801
DMA ADDRESS GENERATOR	
2940	5962-8603001
DMA CONTROLLER	
Z80ADMA	/48201
Z80DMA	/48202
DMA CONTROLLER 32-BIT WITH INTEGRATED SYSTEM SUPPORT PERIPHERALS 16 MHZ	
82380	5962-8959301
DMA CONTROLLER 32-BIT WITH INTEGRATED SYSTEM SUPPORT PERIPHERALS 20 MHZ	
82380	5962-8959302
DMA CONTROLLER EXTENDED DUAL CHANNEL	
68442-8	5962-8681101
DMA CONTROLLER MULTI-MODE	
9517A	5962-8757501
9517A-4	5962-8757502
DMA CONTROLLER PROGRAMMABLE 5 MHZ	
82C37A-5	5962-9054301
DMA CONTROLLER PROGRAMMABLE 8 MHZ	
82C37A	5962-9054302
82C237	5962-9054304
DMA CONTROLLER PROGRAMMABLE 12.5 MHZ	
82C37A-12	5962-9054303
82C237-12	5962-9054305
DYNAMIC MEMORY CONTROLLER	
2964B	5962-8757401
2968A	5962-8869601
DYNAMIC MEMORY CONTROLLER WITH OUTPUT ENABLE	
2968A	5962-8869602
EPLD 64-MACROCELL	
(SEE DWG)	5962-9215801
(SEE DWG)	5962-9215802
ERROR DETECTION AND CORRECTION UNIT 32-BIT 21 NS ACCESS TIME	
49C460C	5962-8853306
ERROR DETECTION AND CORRECTION UNIT 32-BIT 21 NS DETECT TIME	
29C660C	5962-8853305
ERROR DETECTION AND CORRECTION UNIT 32-BIT 28 NS DETECT TIME	
49C460B	5962-8853302
29C660B	5962-8853304
ERROR DETECTION AND CORRECTION UNIT 32-BIT 33 NS DETECT TIME	
49C460A	5962-8853301
29C660A	5962-8853303
ERROR DETECTION/CORRECTION CKT 16-BIT 24 NS DETECT TIME 35 NS CORRECT TIME	
39C60A	5962-8861301
29C60A	5962-8861303
ERROR DETECTION/CORRECTION CKT 16-BIT 36 NS DETECT TIME 73 NS CORRECT TIME	
39C60	5962-8861302
ERROR DETECTION/CORRECTION UNIT 16-BIT	
2960	5962-8760201
FFT CONTROLLER AND ARITHMETIC UNIT 16/19-BIT 15 MHZ	
TMC2310V	5962-9096301
FFT CONTROLLER AND ARITHMETIC UNIT 16/19-BIT 20 MHZ	
TMC2310V1	5962-9096302
GENERATOR MICROPORCESSOR WATCHDOG/BATTERY SWITCHOVER/RESET	
MAX693	5962-9071102
FIFO 4K X 9 20 NS ACCESS TIME	
(SEE DWG)	5962-9071507
FIFO 4K X 9 30 NS ACCESS TIME	
(SEE DWG)	5962-9071506
FIFO 4K X 9 40 NS ACCESS TIME	
(SEE DWG)	5962-9071505
FIFO 4K X 9 50 NS ACCESS TIME	
(SEE DWG)	5962-9071504
FIFO 4K X 9 65 NS ACCESS TIME	
(SEE DWG)	5962-9071503
FIFO 4K X 9 80 NS ACCESS TIME	
(SEE DWG)	5962-9071502
FIFO 4K X 9 120 NS ACCESS TIME	
(SEE DWG)	5962-9071501
FIFO 8K X 9 DUAL PORT 30 NS ACCESS TIME	
(SEE DWG)	5962-9167703
FIFO 8K X 9 DUAL PORT 50 NS ACCESS TIME	
(SEE DWG)	5962-9167702
FIFO 8K X 9 DUAL PORT 80 NS ACCESS TIME	
(SEE DWG)	5962-9167701
FIFO MEMORY 64 X 4 CASCADABLE 7 MHZ	
C57401	5962-8779105
FIFO MEMORY 64 X 4 CASCADABLE 10 MHZ	
C57401A	5962-8779107
FIFO MEMORY 64 X 4 STAND-ALONE THREE-STATE 12 MHZ	
57L4013D	5962-8779111
FIFO MEMORY 64 X 4 STAND-ALONE 7 MHZ	
57401	5962-8779101
FIFO MEMORY 64 X 4 STAND-ALONE 10 MHZ	
57401A	5962-8779103
FIFO MEMORY 64 X 4 STAND-ALONE 12 MHZ	
57L401D	5962-8779109
FIFO MEMORY 64 X 4 10 MHZ	
(SEE DWG)	5962-8952301
FIFO MEMORY 64 X 4 15 MHZ	
(SEE DWG)	5962-8952302
FIFO MEMORY 64 X 4 25 MHZ	
(SEE DWG)	5962-8952303
FIFO MEMORY 64 X 4 35 MHZ	
(SEE DWG)	5962-8952304
FIFO MEMORY 64 X 4 STAND-ALONE 12 MHZ	
57L402D	5962-8779110
FIFO MEMORY 64 X 5 CASCADABLE 7 MHZ	
C57402	5962-8779106
FIFO MEMORY 64 X 5 CASCADABLE 10 MHZ	
C57402A	5962-8779108
FIFO MEMORY 64 X 5 PARALLEL 10 MHZ	
72404L10	5962-8684601
FIFO MEMORY 64 X 5 PARALLEL 15 MHZ	
72404L15	5962-8684602
FIFO MEMORY 64 X 5 PARALLEL 25 MHZ	
72404L25	5962-8684603
FIFO MEMORY 64 X 5 PARALLEL 35 MHZ	
72404L35	5962-8684604
FIFO MEMORY 64 X 5 STAND-ALONE 7 MHZ	
57402	5962-8779102
FIFO MEMORY 64 X 5 STAND-ALONE 10 MHZ	
57402A	5962-8779104
FIFO MEMORY 64 X 8 15 MHZ	
(SEE DWG)	5962-8966401
FIFO MEMORY 64 X 8 25 MHZ	
(SEE DWG)	5962-8966402
FIFO MEMORY 64 X 9 15 MHZ	
(SEE DWG)	5962-8966101
FIFO MEMORY 64 X 9 25 MHZ	
(SEE DWG)	5962-8966102
FIFO MEMORY 256 X 9 PARALLEL 30 NS ACCESS TIME	
(SEE DWG)	5962-8966606
FIFO MEMORY 256 X 9 PARALLEL 40 NS ACCESS TIME	
(SEE DWG)	5962-8966605
FIFO MEMORY 256 X 9 PARALLEL 50 NS ACCESS TIME	
(SEE DWG)	5962-8966604
FIFO MEMORY 256 X 9 PARALLEL 65 NS ACCESS TIME	

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MILITARY PARTS SORTED BY FUNCTION

Industry P/N	Military* PN
(SEE DWG)	5962-8966603
FIFO MEMORY 256 X 9 PARALLEL 80 NS ACCESS TIME	
(SEE DWG)	5962-8966602
FIFO MEMORY 256 X 9 PARALLEL 120 NS ACCESS TIME	
(SEE DWG)	5962-8966601
FIFO MEMORY 512 X 9	
MKB4501-81	/25001
MKB4501-80	/25002
FIFO MEMORY 512 X 9 PARALLEL 30 NS ACCESS TIME	
7201LA30	5962-8753101
FIFO MEMORY 512 X 9 PARALLEL 50 NS ACCESS TIME	
7201LA50	5962-8753102
FIFO MEMORY 512 X 9 PARALLEL 80 NS ACCESS TIME	
7201LA80	5962-8753103
MKB4501-88	/25003
FIFO MEMORY 512 X 9 25 NS ACCESS TIME	
(SEE DWG)	5962-8986306
FIFO MEMORY 512 X 9 30 NS ACCESS TIME	
(SEE DWG)	5962-8986305
FIFO MEMORY 512 X 9 40 NS ACCESS TIME	
(SEE DWG)	5962-8986304
FIFO MEMORY 512 X 9 50 NS ACCESS TIME	
(SEE DWG)	5962-8986303
FIFO MEMORY 512 X 9 65 NS ACCESS TIME	
(SEE DWG)	5962-8986302
FIFO MEMORY 512 X 9 80 NS ACCESS TIME	
(SEE DWG)	5962-8986301
FIFO MEMORY 1K X 9 PARALLEL 30 NS ACCESS TIME	
(SEE DWG)	5962-8953605
FIFO MEMORY 1K X 9 PARALLEL 40 NS ACCESS TIME	
(SEE DWG)	5962-8953604
FIFO MEMORY 1K X 9 PARALLEL 65 NS ACCESS TIME	
(SEE DWG)	5962-8953603
FIFO MEMORY 1K X 9 PARALLEL 80 NS ACCESS TIME	
(SEE DWG)	5962-8953602
FIFO MEMORY 1K X 9 PARALLEL 120 NS ACCESS TIME	
(SEE DWG)	5962-8953601
FIFO MEMORY 2K X 9	
(SEE DWG)	5962-8994201
(SEE DWG)	5962-8994202
(SEE DWG)	5962-8994203
(SEE DWG)	5962-8994204
FIFO MEMORY 2K X 9 PARALLEL 40 NS ACCESS TIME	
(SEE DWG)	5962-8956705
FIFO MEMORY 2K X 9 PARALLEL 50 NS ACCESS TIME	
(SEE DWG)	5962-8956704
FIFO MEMORY 2K X 9 PARALLEL 65 NS ACCESS TIME	
(SEE DWG)	5962-8956703
FIFO MEMORY 2K X 9 PARALLEL 80 NS ACCESS TIME	
(SEE DWG)	5962-8956702
FIFO MEMORY 2K X 9 PARALLEL 120 NS ACCESS TIME	
(SEE DWG)	5962-8956701
FIFO MEMORY 2K X 9 30 NS ACCESS TIME	
(SEE DWG)	5962-8866905
FIFO MEMORY 2K X 9 40 NS ACCESS TIME	
(SEE DWG)	5962-8866904
FIFO MEMORY 2K X 9 50 NS ACCESS TIME	
(SEE DWG)	5962-8866903
FIFO MEMORY 2K X 9 65 NS ACCESS TIME	
(SEE DWG)	5962-8866902
FIFO MEMORY 2K X 9 80 NS ACCESS TIME	
(SEE DWG)	5962-8866901
FIFO MEMORY 4K X 9 PARALLEL SERIAL 120 NS ACCESS TIME	
(SEE DWG)	5962-8994301
FIFO MEMORY 4K X 9 PARALLEL SERIAL 50 NS ACCESS TIME	
(SEE DWG)	5962-8994304
FIFO MEMORY 4K X 9 PARALLEL SERIAL 65 NS ACCESS TIME	
(SEE DWG)	5962-8994303
FIFO MEMORY 4K X 9 PARALLEL SERIAL 80 NS ACCESS TIME	
(SEE DWG)	5962-8994302
FIFO MEMORY 4K X 9 PARALLEL 40 NS ACCESS TIME	
(SEE DWG)	5962-8956805
FIFO MEMORY 4K X 9 PARALLEL 50 NS ACCESS TIME	
(SEE DWG)	5962-8956804
FIFO MEMORY 4K X 9 PARALLEL 65 NS ACCESS TIME	
(SEE DWG)	5962-8956803
FIFO MEMORY 4K X 9 PARALLEL 80 NS ACCESS TIME	
(SEE DWG)	5962-8956802
FIFO MEMORY 4K X 9 PARALLEL 120 NS ACCESS TIME	
(SEE DWG)	5962-8956801
GRAPHICS SYSTEM PROCESSOR	
34020-28	5962-9162301
34020-30	5962-9162302
I/O CONTROLLER DUAL	
Z-80SIO/2	/48102
I/O CONTROLLER DUAL SERIAL 6.17 MHZ	
Z84C4206	5962-8951601
I/O CONTROLLER PARALLEL	
Z80APIO	/48401
Z80PIO	/48402
I/O CONTROLLER PARALLEL 2.5 MHZ	
Z8420	5962-8418602
I/O CONTROLLER PARALLEL 4.0 MHZ	
Z8420A	5962-8418601
I/O CONTROLLER PARALLEL 6.17 MHZ	
Z84C2006	5962-8951401
I/O PORT 8-BIT	
1852	/47301
8212	/42101
I/O PORT 8-BIT BIDIRECTIONAL LATCHED	
8X371	5962-8757601
I/O PORT PROGRAMMABLE ADDRESSABLE BIDIRECTIONAL ASYNCHRONOUS	
8X376	5962-8685101
INTERFACE UNIT BUS TO MICROPROCESSOR MIL-STD-1553	
BUS-66300II	5962-8858601
INTERRUPT CONTROLLER PROGRAMMABLE	
8259A	5962-8751801
INTERRUPT CONTROLLER PROGRAMMABLE 5 MHZ	
82C59A-5	5962-8501601
INTERRUPT CONTROLLER PROGRAMMABLE 8 MHZ	
82C59A	5962-8501602
INTERRUPT CONTROLLER UNIVERSAL	
9519A	5962-8759701
INTERRUPT CONTROLLER VECTORED PRIORITY	
2914	5962-8602901
INTERVAL TIMER PROGRAMMABLE	
82C54	5962-8406501
9513A	5962-8552301
8253	5962-8752001
8253	5962-8752002
8253-5	5962-8752003
LATCH BUS INTERFACE 10-WIDE	
29C841	5962-8760301
29C941	5962-8760303
LATCH BUS INTERFACE 9-WIDE	
29C843	5962-8760302
29C943	5962-8760304
MEMORY MANAGEMENT BLOCK PROTECTION UNIT 20 MHZ	
P1753	5962-8950504
MEMORY MANAGEMENT BLOCK PROTECTION UNIT 30 MHZ	
P1753	5962-8950505
MEMORY MANAGEMENT BLOCK PROTECTION UNIT 40 MHZ	
P1753	5962-8950506
MEMORY MANAGEMENT BLOCK PROTECTION UNIT WITH BUS ARBITRATION 20 MHZ	
P1753	5962-8950501
MEMORY MANAGEMENT BLOCK PROTECTION UNIT WITH BUS ARBITRATION 30 MHZ	
P1753	5962-8950502
MEMORY MANAGEMENT BLOCK PROTECTION UNIT WITH BUS ARBITRATION 40 MHZ	
P1753	5962-8950503
MICROCOMPUTER 8-BIT	
8048	/49001
8035L	/49002
MICROCOMPUTER 8-BIT WITH 1K X 8 PROGRAM MEMORY AND 64 X 8 RAM DATA MEMORY	
8048AH	5962-8856802
MICROCOMPUTER 8-BIT WITH 32K-BIT UVEPROM 12.0 MHZ MAX	
8751H	5962-8419002
MICROCOMPUTER 8-BIT WITH 32K-BIT UVEPROM 8.0 MHZ MAX	
8751H-8	5962-8419001
MICROCOMPUTER 8-BIT WITH 64 X 8 RAM DATA MEMORY	
8035AHL	5962-8856801
MICROCONTROLLER 16-BIT	
8097	5962-8506301
8X305	5962-8550201
8X305-10	5962-8550202

*Part numbers beginning with a slash "/" are MIL-M-38510 numbers. All others are DESC drawing numbers.

MILITARY PARTS SORTED BY FUNCTION

Industry P/N	Military* PN
8X320	5962-8550301
MICROCONTROLLER 16-BIT 12 MHZ	
80C196KB	5962-8998201
8097BH	5962-8959601
MICROCONTROLLER 16-BIT WITH 16K-BYTES OF ON-CHIP EPROM 16 MHZ	
87C196KC	5962-9069201
MICROCONTROLLER 16-BIT WITH 8K BYTES ON-CHIP ROM 12 MHZ	
8397BH	5962-8977201
MICROCONTROLLER 16-BIT WITH EPROM	
8797BH	5962-8680901
MICROCONTROLLER 16-BIT WITH MASK-PROGRAMMABLE ROM	
8397	5962-8552001
MICROCONTROLLER 8-BIT (3.5 TO 12 MHZ)	
80C31	5962-8506401
MICROCONTROLLER 8-BIT (3.5 TO 16 MHZ)	
80C31-1	5962-8506403
MICROCONTROLLER 8-BIT EPROM	
87C451	5962-9154201
MICROCONTROLLER 8-BIT EEPROM 2K BYTES RAM 256 BYTES	
68HC811E2	5962-8952701
MICROCONTROLLER 8-BIT ROM AND EEPROM DISABLED 256 BYTES RAM	
68HC11A0	5962-9051001
MICROCONTROLLER 8-BIT ROM DISABLED 256 BYTES RAM 512 BYTES EEPROM	
68HC11A1	5962-9051002
MICROCONTROLLER 8-BIT WITH 2 KILOBYTES EPROM MEMORY	
87C751	5962-9156601
MICROCONTROLLER 8-BIT WITH 4K-BYTES EPROM MEMORY (3.5 TO 12 MHZ)	
87C51	5962-8768401
MICROCONTROLLER 8-BIT WITH 4K-BYTES EPROM MEMORY (3.5 TO 16 MHZ)	
87C51-16	5962-8768402
MICROCONTROLLER 8-BIT WITH 8K-BYTES EPROM MEMORY (3.5 TO 12 MHZ)	
87C52	5962-9157601
87C52	5962-9157603
MICROCONTROLLER 8-BIT WITH 8K-BYTES EPROM MEMORY (3.5 TO 16 MHZ)	
87C52-16	5962-9157602
87C52-16	5962-9157604
MICROCONTROLLER 8-BIT WITH A MASK PROGRAMMABLE ROM (3.5 TO 12 MHZ)	
80C51	5962-8506402
MICROCONTROLLER 8-BIT WITH A MASK PROGRAMMABLE ROM (3.5 TO 16 MHZ)	
80C31BH-16	5962-8506404
MICROCONTROLLER 8-BIT WITH A/D PWM 2K 1-TIME PROGR. EPROM MEMORY (3.5-12MHZ)	
87C752	5962-9157703
MICROCONTROLLER 8-BIT WITH A/D PWM 2K 1-TIME PROGR. EPROM MEMORY (3.5-16MHZ)	
87C752-16	5962-9157704
MICROCONTROLLER 8-BIT WITH A/D PWM 2K EPROM MEMORY (3.5-12 MHZ)	
87C752	5962-9157701
MICROCONTROLLER 8-BIT WITH A/D PWM 2K EPROM MEMORY (3.5-16 MHZ)	
87C752-16	5962-9157702
MICROCONTROLLER HIGH PERFORMANCE	
HCP16003	5962-9054401
HPC16083	5962-9054402
MICROCONTROLLER I/O EXPANDED	
80C451	5962-8972601
MICROCONTROLLER I/O EXPANDED WITH MASK-PROGRAMMABLE ROM	
83C451	5962-8972602
MICROPROCESSOR SLICE 16-BIT	
7C9101-45	5962-8951701
7C9101-35	5962-8951702
MICROPROCESSOR SLICE 4-BIT	
2901C	5962-8405701
2901C	/44001
MICROPROCESSOR 16-BIT	
29C116	5962-8861201
29116	5962-8686301
9900A	/46001
29C116-1	5962-8861202
SBP9989	/46501
29C116-2	5962-8861203
7C9116-40	5962-8861204
8086	/53001
MICROPROCESSOR 16-BIT FIXED INSTRUCTION	
MKB68000-6	5962-8202101
MKB68000-8	5962-8202102
68000-10	5962-8202103
68000-12	5962-8202104
68000-6	/54001
68000-8	/54002
68000-10	/54003
MICROPROCESSOR 16-BIT 10 MHZ	
80C186-10	5962-8850101
80C286-10	5962-9067801
80286-10	5962-8514803
Z8001B	5962-8000304
Z8002B	5962-8000305
MICROPROCESSOR 16-BIT 12 MHZ	
80C286-12	5962-9067802
MICROPROCESSOR 16-BIT 12.5 MHZ	
80C186-12	5962-8850102
MICROPROCESSOR 16-BIT 15 MHZ	
1750A-15	5962-8766501
MICROPROCESSOR 16-BIT 20 MHZ	
1750A-20	5962-8766502
MICROPROCESSOR 16-BIT 30 MHZ	
1750A-30	5962-8766503
MICROPROCESSOR 16-BIT 4.0 MHZ	
Z8001CPU	5962-8000301
Z8001CPU	/52001
Z8002CPU	5962-8000302
Z8002CPU	/52002
MICROPROCESSOR 16-BIT 40 MHZ	
P1750A-40	5962-8766504
MICROPROCESSOR 16-BIT 5 MHZ	
80C86	5962-8405201
MICROPROCESSOR 16-BIT 6 MHZ	
M80186-6	5962-8501002
80286-6	5962-8514802
MICROPROCESSOR 16-BIT 6.0 MHZ	
Z8001ACPU	5962-8000303
Z8001ACPU	/52003
Z8002A CPU	/52004
Z8002ACPU	5962-8000306
MICROPROCESSOR 16-BIT 8 MHZ	
80286-8	5962-8514801
M80186-8	5962-8501001
80C86-2	5962-8405202
MICROPROCESSOR 16-BIT WITH MIL-STD-1750 INSTRUCTION SET ARCHITECTURE	
BX1750A	5962-8951991
MICROPROCESSOR 16-BIT WITH MIL-STD-1750 INSTRUCTION SET ARCHITECTURE 15.0 MHZ	
F9450-15	5962-8416901
F9450-F15	5962-8416904
MICROPROCESSOR 16-BIT WITH MIL-STD-1750 INSTRUCTION SET ARCHITECTURE 18.0 MHZ	
F9450-F18	5962-8416902
MICROPROCESSOR 16-BIT WITH MIL-STD-1750 INSTRUCTION SET ARCHITECTURE 20.0 MHZ	
F9450-F20	5962-8416903
MICROPROCESSOR 16-BIT WITH MIL-STD-1750A INSTRUCTION SET ARCHITECTURE	
BX1750A	5962-8951901
MICROPROCESSOR 32-BIT	
68020-12	5962-8603201
68020	5962-8603202
68020-16	5962-8603203
MICROPROCESSOR 32-BIT ENHANCED	
68030-16	5962-8946401
68030-20	5962-8946402
68030-25	5962-8946403
68030-33	5962-8946404
MICROPROCESSOR 32-BIT 12.5 MHZ	
80386-12	5962-8766802
MICROPROCESSOR 32-BIT 16 MHZ	
80386-16	5962-8766801
MICROPROCESSOR 32-BIT 20 MHZ	
80386-20	5962-8766803
MICROPROCESSOR 32-BIT 25 MHZ	
80386-25	5962-8766804
MICROPROCESSOR 32-BIT WITH FLOATING POINT AND MMU 16 MHZ	
80960MC-16	5962-9094601
MICROPROCESSOR 32-BIT WITH FLOATING POINT AND MMU 20 MHZ	
80960MC-20	5962-9094602
MICROPROCESSOR 32-BIT WITH FLOATING POINT AND MMU 25 MHZ	
80960MC-25	5962-9094603
MICROPROCESSOR 4-BIT	
2901A	5962-7700701
2903A	5962-8867701
AM2901	5962-7700702
MICROPROCESSOR 4-BIT SLICE 27 NS CYCLE TIME	
7C901-27	5962-8853502
MICROPROCESSOR 4-BIT SLICE 32 NS CYCLE TIME	
7C901-32	5962-8853501
MICROPROCESSOR 8-BIT	
Z-80ACPU	/48001
6800	/40001
80C88	5962-8601601
Z-80CPU	/48002
8088	5962-8768501
1802D	/47001
Z-80BCPU	/48003
Z-80BCMOS	/48501
MICROPROCESSOR 8-BIT 2.5 MHZ	
NSC800	5962-8301301
MICROPROCESSOR 8-BIT 3.5 MHZ	
NSC800-4	5962-8301302
MICROPROCESSOR 8-BIT FIXED INSTRUCTION	
8080A	/42001
8080A	5962-7700201
MICROPROCESSOR 8-BIT N-CHANNEL FIXED INSTRUCTION	
8085A	5962-7901001
MICROPROCESSOR NUMERIC 80-BIT 10 MHZ	
80287-10	5962-8513301
MICROPROCESSOR NUMERIC 80-BIT 6 MHZ	
80287-5	5962-8513303
MICROPROCESSOR NUMERIC 80-BIT 8 MHZ	
80287-8	5962-8513302

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MILITARY PARTS SORTED BY FUNCTION

Industry P/N	Military* PN
MICROPROCESSOR SIGNAL PROCESSING 10 MHZ	
2100ATG	5962-8773504
MICROPROCESSOR SIGNAL PROCESSING 6 MHZ	
2100SG	5962-8773501
MICROPROCESSOR SIGNAL PROCESSING 8 MHZ	
2100TG	5962-8773502
2100ASG	5962-8773503
MICROPROGRAM SEQUENCER 16-BIT WITH 33-DEEP STACK	
49C410	5962-8864301
49C410A	5962-8864302
MICROPROGRAM SEQUENCER 4-BIT	
2909A	5962-8602701
2911A	5962-8602801
MULTIPLEXED TERMINAL MIL-STD-1553 BC/RTU/MT	
(SEE DWG)	5962-8869201
(SEE DWG)	5962-9173401
(SEE DWG)	5962-8869202
(SEE DWG)	5962-9173402
(SEE DWG)	5962-9173403
(SEE DWG)	5962-9173404
MULTIPLEXED TERMINAL MIL-STD-1553 BC/RTU/MT TRANSCEIVER	
(SEE DWG)	5962-8869203
MULTIPLEXED TERMINAL MIL-STD-1553 BC/RTU/MT TRANSCEIVERLESS	
(SEE DWG)	5962-8869204
MULTIPLIER 12-BIT PARALLEL	
MPY012HC1V	/50005
MULTIPLIER 16-BIT PARALLEL	
MPY016HC1V	/50006
MULTIPLIER 8-BIT PARALLEL	
TDC1008C1V	/50001
MPY008HC2V	/50004
MULTIPLIER/ACCUMULATOR 12 X 12	
TDC1009C1V	/50002
MULTIPLIER/ACCUMULATOR 16 X 16	
TDC1010C1V	/50003
NUMERIC PROCESSOR EXTENSION 80-BIT	
80387-16	5962-8953401
80387-20	5962-8953402
80387-25	5962-8953403
NUMERIC PROCESSOR 80-BIT 10 MHZ	
80C287-10	5962-9065601
80C187-10	5962-8944901
NUMERIC PROCESSOR 80-BIT 12 MHZ	
80C187-12	5962-8944902
PERIPHERAL INTERFACE ADAPTOR	
MC6821	/40101
PERIPHERAL INTERFACE PROGRAMMABLE	
8255A	5962-8757001
8255A-5	5962-8757002
PERIPHERAL INTERFACE PROGRAMMABLE 5.0 MHZ	
82C55A-5	5962-8406601
PERIPHERAL INTERFACE PROGRAMMABLE 8.0 MHZ	
82C55A	5962-8406602
PERIPHERAL INTERFACT REMOTE UNIVERSAL	
8744H-10	5962-8997101
PERIPHERAL MULTIFUNCTION	
68C901B-8	5962-9086403
PERIPHERAL MULTIFUNCTION 4 MHZ	
68901-4	5962-8850601
PERIPHERAL MULTIFUNCTION 4.0 MHZ	
68C901B-4	5962-9086401
PERIPHERAL MULTIFUNCTION 5 MHZ	
68901-5	5962-8850602
PERIPHERAL MULTIFUNCTION 5.0 MHZ	
68C901B-5	5962-9086402
PROCESSOR INTERFACE 20 MHZ	
P1754	5962-8864204
PROCESSOR INTERFACE 30 MHZ	
P1754	5962-8864205
PROCESSOR INTERFACE 40 MHZ	
P1754	5962-8864206
PROCESSOR INTERFACE WITH SYSTEM CONFIGURATION INPUTS 20 MHZ	
P1754	5962-8864201
PROCESSOR INTERFACE WITH SYSTEM CONFIGURATION INPUTS 30 MHZ	
P1754	5962-8864202
PROCESSOR INTERFACE WITH SYSTEM CONFIGURATION INPUTS 40 MHZ	
P1754	5962-8864203
PROGRAM CONTROL UNIT 4-BIT	
2930	5962-8757301
PROGRAM CONTROL UNIT/PUSH-POP STACK	
AM2932	5962-8605001
PROGRAMMABLE TIMER/COUNTER DMA ADDRESS GENERATOR	
2942	5962-8680101
REAL TIME CLOCK	
8572	5962-9164101
REMOTE TERMINAL INTERFACE MIL-STD-1553B	
UT1553BCRTMP	5962-8950101
UT1553BRTI	/55501
REMOTE TERMINAL MULTI-PROTOCOL	
1553RTMP	5962-8864501
SIGNAL PROCESSING ELEMENT	
(SEE SPEC)	/62001
(SEE SPEC)	/62002
SIGNAL PROCESSOR DIGITAL	
32010	5962-8405301
SIGNAL PROCESSOR DIGITAL 20 MHZ	
320C10	5962-8763301
SIGNAL PROCESSOR DIGITAL 25 MHZ	
320C10-25	5962-8763302
SIGNAL PROCESSOR DIGITAL 40 MHZ	
320C25	5962-8861901
SIGNAL PROCESSOR DIGITAL 50 MHZ	
320C25-50	5962-8861902
SIGNAL PROCESSOR DIGITAL 6.7 - 20 MHZ	
320C15	5962-8763307
SIGNAL PROCESSOR DIGITAL 6.7 - 25 MHZ	
320CF10-25	5962-8763305
320C15-25	5962-8763308
SIGNAL PROCESSOR DIGITAL WITH EPROM 20 MHZ	
320E15	5962-8763306
SIGNAL PROCESSOR DIGITAL WITH MASK PROGRAMMABLE ROM 25 MHZ	
320CM10	5962-8763303
320CM10-25	5962-8763304
TIMING CONTROL UNIT 10 MHZ	
32C201-10	5962-8859901
32C201-10	/55201

Operational amplifiers 9/

Industry P/N	Military* PN
BUFFER AMPLIFIER WIDE-BAND	
CLC110	5962-8997501
EL2072	5962-8997502
CURRENT AMPLIFIER	
LH0002	5962-7801301
INSTRUMENTATION AMPLIFIER	
INA101	5962-8778002
INSTRUMENTATION AMPLIFIER LOW-NOISE PRECISION	
AMP-01A	5962-8863001
AMP-01B	5962-8863002
INSTRUMENTATION AMPLIFIER PRECISION	
AD524S	/14301
AD524	5962-8853901
INSTRUMENTATION AMPLIFIER PROGRAMMABLE GAIN	
AD625	5962-8771901
INSTRUMENTATION AMPLIFIER WITH GAIN SENSE	
INA101	5962-8778001
OP AMP	
4250	5962-7703901
CA3130BT	5962-7703301
LM107	5962-8958901
0032	5962-8001301
OP AMP 14 V/ÊS	
HA-5137	5962-8962702
OP AMP 28 V/ÊS	
HA-5147	5962-8962703
OP AMP 4-CHANNEL PROGRAMMABLE	
HA-2400	5962-8778301
OP AMP 7.0 V/ÊS	
HA-5127	5962-8962701
OP AMP BI-FET LOW POWER	
061	5962-8102301
061	/11901
071	/11904
071	5962-8102304
OP AMP CHOPPER-STABILIZED	
LTC1052	5962-8978201
OP AMP CLAMPING LOW-GAIN FAST-SETTLING	
CLC502	5962-9174301
OP AMP DUAL	
LH2101A	/10105
LH2108A	/10106
1558	/10108
OP AMP DUAL LOW-NOISE	
5532A	/13102
OP AMP DUAL MATCHED HIGH PERFORMANCE	
OP14A	5962-8771401
LT1013A	5962-8876001
OP14B	5962-8771402
LT1013	5962-8876002
OP AMP DUAL PRECISION	
TLC272	5962-8949401
TLC277	5962-8949402
OP AMP DUAL PRECISION JFET-INPUT	
OP215A	5962-8853801
OP215B	5962-8853802
OP AMP DUAL PRECISION JFET-INPUT WITH BALANCE ADJUST	
OP215BR	5962-8853803
OP AMP DUAL PRECISION LOW POWER	
TLC27L2	5962-8949403
TLC27L7	5962-8949404
OP AMP DUAL BI-FET LOW POWER	
062	5962-8102302
062	/11902
072	/11905
072	5962-8102305
OP AMP DUAL FAST-SETTLING	
LM6118	5962-9156501

*Part numbers beginning with a slash "/" are MIL-M-38510 numbers. All others are DESC drawing numbers.

Industry P/N	Military* PN
OP AMP DUAL HIGH-SPEED CURRENT-FEEDBACK	
OP-260A	5962-9053601
OP AMP DUAL HIGH-SPEED CURRENT FEEDBACK	
EL2232	5962-9167501
OP AMP DUAL HIGH-SPEED LOW-POWER	
AD827	5962-9211701
TLE2022	5962-9088102
OP AMP DUAL HIGH-SPEED PRECISION	
OP249A	5962-9151901
OP AMP DUAL JFET HIGH-SPEED	
LT1057A	5962-9081701
LT1057	5962-9081702
OP AMP DUAL JFET-INPUT HIGH-OUTPUT-DRIVE MICROPOWER	
TLE2062M	5962-9080801
OP AMP DUAL LOW-NOISE	
HA-5102	5962-8954801
OP AMP DUAL LOW-NOISE UNCOMPENSATED	
HA-5112	5962-8963201
OP AMP DUAL LOW-NOISE HIGH-SPEED	
OP-271A	5962-8872102
OP AMP DUAL LOW-NOISE PRECISION	
OP-270A	5962-8872101
OP AMP DUAL LOW-OFFSET LOW-NOISE	
OP-227A	5962-8688701
OP-227A	/13504
OP AMP DUAL LOW-OFFSET LOW-NOISE HIGH-SPEED	
OP-237A	5962-9056801
OP-237C	5962-9056802
OP AMP DUAL LOW-OFFSET LOW-POWER	
OP-200A	5962-8859301
OP AMP DUAL LOW-POWER	
LM158	5962-8771001
LM158A	5962-8771002
HA-5142	5962-8965602
OP AMP DUAL PRECISION LOW-VOLTAGE MICROPOWER	
OP-290	5962-8978301
OP AMP DUAL ULTRA-LOW OFFSET MATCHED	
OP207	5962-8771501
OP AMP FAST SETTLING VIDEO	
HOS-050A	5962-8857901
HOS-060SH	5962-8857902
OP AMP FAST SETTLING UNITY GAIN STABLE	
AD841	5962-8964101
OP AMP GENERAL PURPOSE	
741A	/10101
LM101A	/10103
LM108A	/10104
LM709	5962-7800701
OP AMP GENERAL PURPOSE DUAL	
747A	/10102
OP AMP HIGH SPEED PRECISION JFET	
LT1055A	5962-8997601
LT1056A	5962-8997602
LT1055	5962-8997603
LT1056	5962-8997604
OP AMP HIGH SPEED VOLTAGE FEEDBACK	
CLC420A	5962-9175801
CLC420B	5962-9175802
OP AMP HIGH SPEED WIDEBAND	
CLC221A	5962-9083601
OP AMP HIGH VOLTAGE	
PA84M	5962-9073601
OP AMP HIGH-OUTPUT-CURRENT	
OP-50A	5962-8967301
OP-50B	5962-8967302
OP AMP HIGH-POWER	
42106	5962-8762001
OPA541	5962-8870101
PA51	5962-8762002
OP AMP HIGH-POWER (0.2A OUTPUT) EXTERNALLY COMPENSATED	
LH0041	5962-8508701
OP AMP HIGH-POWER (1A OUTPUT) EXTERNALLY COMPENSATED	
LH0021	5962-8508801
OP AMP HIGH-SPEED	
LM6161	5962-8962101
LM6164	5962-8962401
LM6165	5962-8962501
2510	/12205
2520	/12206
LM118	/10107
OP AMP HIGH-SPEED OUTPUT CLAMPING	
CLC500	5962-9092501
OP AMP HIGH-SPEED PROGRAMMABLE SUPPLY CURRENT	
CLC505	5962-9099301
OP AMP HIGH-SPEED FAST SETTLING PRECISION	
OP-42A	5962-8851301
OP-42B	5962-8851302
OP-42	/12208
OP AMP HIGH-SPEED LOW-POWER	
TLE2021	5962-9088101
OP AMP HIGH-SPEED OUTPUT CLAMPING	
CLC501	5962-8997401
OP AMP HIGH-SPEED PRECISION JFET-INPUT	
LT1022A	5962-8962201
LT1022	5962-8962202
OP AMP HIGH-SPEED PRECISION JFET	
OP44A	5962-8980401
OP44A	/12207
OP AMP HIGH-SPEED WIDEBANDWIDTH	
OP64A	5962-9053501
OP AMP HIGH-SPEED WIDEBAND	
CLC200A	5962-8991001
CLC231A	5962-8959401
CLC220A	5962-8991101
OP AMP HIGH-VOLTAGE	
LM144	5962-7800301
2640	5962-7800302
LM143	5962-7800303
1536	5962-7800304
OP AMP JFET	
LF155	/11401
LF156	/11402
LF157	/11403
LF155A	/11404
LF156A	/11405
LF157A	/11406
OP AMP JFET-INPUT	
OP-15A	5962-8954201
OP-15B	5962-8954202
OP-16A	5962-8954301
OP-16B	5962-8954302
OP-16C	5962-8954303
OP AMP JFET-INPUT (INTERNALLY COMPENSATED)	
OP-17A	5962-8770601
OP-17B	5962-8770602
OP AMP JFET-INPUT HIGH-OUTPUT-DRIVE MICROPOWER	
TLE2061M	5962-9080701
OP AMP LOW-NOISE	
5534A	/13101
HA-5101	5962-8963501
OP AMP LOW-NOISE CHOPPER-STABILIZED	
TLC2654M	5962-9089502
OP AMP LOW-NOISE HIGH-SPEED PRECISION	
LT1007A	5962-8757801
TLE2027M	5962-9089601
OP AMP LOW-NOISE HIGH-SPEED PRECISION UNCOMPENSATED	
TLE2037M	5962-9089602
OP AMP LOW-NOISE HIGH-SPEED PRECISION	
LT1028M	5962-8862201
LT1037A	5962-8856701
LT1028AM	5962-8862202
OP AMP LOW-NOISE PRECISION HIGH-SPEED	
OP-37A	5962-8853701
OP37B	5962-8853702
OP37C	5962-8853703
OP-37A	/13505
OP AMP LOW-NOISE UNCOMPENSATED	
HA-5111	5962-8963101
OP AMP LOW-OFFSET	
OP-77B	5962-8773801
714	/13502
OP-07	5962-8203602
OP-77A	5962-8773802
OP AMP LOW-POWER	
HA-5141	5962-8965601
2700	/12201
OP AMP LOW-POWER HIGH PRECISION	
OP-97	5962-8954401
OP AMP MULTIPLEXER QUAD	
LM604	5962-8963901
OP AMP POWER	
MIOP42119	5962-9170001
MIOP42116	5962-9072301
PA83M/883	5962-9162101
MIOP42114	5962-9063801
MIOP42109	5962-9065901
MIOP42115	5962-9082801
PA02	5962-9067901
LH0101A	5962-8508901
LH0101	5962-8508902
OP AMP PRECISION	
OP-07A	5962-8203601
OP-07A	/13501
OP-27A	/13503
2500	/12204
OP AMP PRECISION CHOPPER-STABILIZED	
TLC2652M	5962-9089501
TLC2652A	5962-9089503
OP AMP PRECISION FAST-SETTLING	
AD843	5962-9098001
OP AMP QUAD	
LM124	5962-7704301
LM148	/11001
LM124A	5962-7704302
LM149	/11002
4156	/11003
4136	/11004
LM124	/11005
LM124A	/11006
OP AMP QUAD PRECISION	
LT1014A	5962-8967701
LT1014	5962-8967702
OP AMP QUAD BI-FET LOW POWER	
064	5962-8102303
064	/11903
074	/11906
074	5962-8102306
OP AMP QUAD BIFET	
AD713S	5962-9063301
AD713T	5962-9063302
OP AMP QUAD HIGH-SPEED LOW NOISE	
OP-471A	5962-8856502
OP AMP QUAD HIGH-SPEED LOW-POWER	
TLE2024	5962-9088103
OP AMP QUAD JFET-INPUT HIGH-OUTPUT-DRIVE MICROPOWER	
TLE2064	5962-9080901
OP AMP QUAD LOW-NOISE	
HA-5104	5962-8850201
OP AMP QUAD LOW-NOISE UNCOMPENSATED	
HA-5114	5962-8963401
OP AMP QUAD LOW-OFFSET LOW POWER	
OP-400A	5962-8777101
OP AMP QUAD LOW-POWER	
OP421B	5962-8855901
OP421C	5962-8855902
HA-5144	5962-8965603

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MILITARY PARTS SORTED BY FUNCTION

Industry P/N	Military* PN
OP AMP QUAD LOW-VOLTAGE MICROPOWER	
OP490A	5962-8967001
OP AMP QUAD MATCHED	
OP-11A	5962-8980101
OP-11B	5962-8980102
OP AMP QUAD PRECISION	
TLC274	5962-9060401
TLC279	5962-9060402
OP AMP QUAD PRECISION HIGH-SPEED JFET	
LT1058A	5962-8989701
LT1058	5962-8989702
OP AMP QUAD SINGLE SUPPLY	
35074	5962-8996901
35074A	5962-8996902
OP AMP QUAD VERY LOW NOISE	
OP-470A	5962-8856501
OP AMP ULTRA-HIGH FREQUENCY EXTERNAL COMPENSATION	
5539	5962-8606401
OP AMP VIDEO	
HA-2544	5962-8950201
OP AMP WIDEBAND	
1437	5962-8981301
2600	/12202
2620	/12203
HA-2540	5962-8964801
EL-2040	5962-8964802
OP AMP WIDEBAND FAST SETTLING	
HA-5190	5962-8778401
AD840	5962-8964001
EL-2190	5962-8778402
OP AMP WIDEBAND FAST SETTLING CURRENT FEEDBACK	
400	5962-8997001
OP AMP WIDEBAND FAST SETTLING HIGH GAIN	
CLC401	5962-8997301
EL2171	5962-8997302
OP AMP WIDEBAND FAST SETTLING HIGH OUTPUT CURRENT	
AD842	5962-8964201
OP AMP WIDEBAND FAST SETTLING UNITY GAIN STABLE	
HA-2541	5962-8778501
EL-2041	5962-8778502
OP AMP WIDEBAND HIGH SLEW RATE	
EL2038	5962-9153501
HA-2539	5962-8778701
CLC404	5962-9099401
EL-2039	5962-8778702
OP AMP WIDEBAND HIGH SLEW RATE HIGH OUTPUT CURRENT	
HA-2542	5962-8964301
OP AMP WIDEBAND HIGH-SPEED	
CLC201A	5962-9083301
OP AMP WIDEBAND LOW DISTORTION	
CLC207A	5962-9097701
CLC232A	5962-9166501
OP AMP WIDEBAND OVERDRIVE PROTECTED	
CLC206A	5962-8985801
CLC205A	5962-9083501
OP AMP WIDEBAND WITH DISABLE	
CLC410	5962-9060001
OP AMP/VOLT. REFERENCE	
LM10	5962-8760401
TRANSISTOR ARRAY	
3018A	/10801
VIDEO AMPLIFIER TWO-STAGE DIFFERENTIAL INPUT DIFFERENTIAL OUTPUT	
733	5962-8418501
592	5962-8418502
VOLT. FOLLOWER	
LM102	/10601
LM2110	/10603
VOLT. FOLLOWER HIGH-SPEED	
LM110	5962-8760601
LM110	/10602
VOLTAGE FOLLOWER/BUFFER AMPLIFIER WITH FET INPUTS	
LH0033	5962-8001401
WIDEBAND AMPLIFIER TWO-CHANNEL INPUT	
1545	5962-8671201
WIDEBAND AMPLIFIER WIT AGC	
1590	5962-8765701

Comparators 10/

Industry P/N	Military* PN
MAGNITUDE COMPARATOR 8-BIT	
54LS682	5962-8415101
54LS684	5962-8415201
MAGNITUDE COMPARATOR 8-BIT WITH ENABLE AND PULL-UP RESISTORS	
54AC520	5962-9091601
54AC11520	5962-9091602
MAGNITUDE COMPARATOR 8-BIT WITH OUTPUT ENABLE	
54LS688	5962-8415301
VOLT. COMPARATOR	
LT1011A	5962-9062701
LT1011	5962-9062702
VOLT. COMPARATOR DIFFERENTIAL	
710	/10301
VOLT. COMPARATOR DIFFERENTIAL HIGH-SPEED	
LM160	5962-8767401
760	5962-8754501
529	5962-8757202
LM161	5962-8757203
VOLT. COMPARATOR DIFFERENTIAL HIGH-SPEED WITH EMITTER-FOLLOWER INPUT	
527	5962-8757201
VOLT. COMPARATOR DUAL	
LT1017	5962-8950401
LT1018	5962-8950402
LM193	/11202
AM687	5962-7801901
AM6687	5962-7801902
AD96687	5962-7801903
LH2111	/10305
VOLT. COMPARATOR DUAL DIFFERENTIAL	
521	5962-8751601
TLC372	5962-8765801
711	/10302
TL514	5962-8687801
VOLT. COMPARATOR DUAL HIGH-SPEED	
LM119	5962-8601401
LT119A	5962-8601402
LM119	/10306
LT119A	/10307
VOLT. COMPARATOR FAST PRECISION	
CMP-01	5962-8987101
VOLT. COMPARATOR HIGH-SPEED	
LM106	5962-8003701
LT1016	5962-8684501
AM686	5962-7801801
LM106	/10303
VOLT. COMPARATOR HIGH-SPEED OPEN-EMITTER OUTPUT	
685	5962-8600801
685	5962-8600802
6685	5962-8600803
96685	5962-8600804
VOLT. COMPARATOR HIGH-SPEED PRECISION WITH LATCH CIRCUIT	
AD790	5962-9150501
VOLT. COMPARATOR QUAD	
LM139	5962-7700801
LM139	/11201
LM139A	5962-8773901
VOLT. COMPARATOR QUAD DIFFERENTIAL	
TLC374	5962-8765901
VOLT. COMPARATOR QUAD DIFFERENTIAL LOW-POWER	
TLC3704M	5962-9096901
VOLT. COMPARATOR QUAD LOW-POWER PRECISION	
CMP404A	5962-8990401
CMP404B	5962-8990402
CMP04B	5962-8990403
VOLT. COMPARATOR QUAD PRECISION	
HA-4902	5962-8686001
VOLT. COMPARATOR/BUFFER PRECISION	
LM111	5962-8687701
LM111	/10304

Regulators 12/

Industry P/N	Military* PN
BINARY CORRELATOR AND TEMPLATE MATCHER 1024-TAP 16 MHZ	
L64230-16	5962-9050402
MODULATOR/DEMODULATOR CONTINOUSLY VARIABLE SLOPE DELTA	
3517	5962-8764301
POWER SUPPLY CONTROL CIRCUIT SWITCHED-MODE	
5560	5962-8672201
PULSE WIDTH MODULATOR CONTROLLER CURRENT-MODE	
UC1846	5962-8680601
1846	/70201
PULSE WIDTH MODULATOR CONTROLLER HIGH SPEED	
1825	5962-8768101
PULSE WIDTH MODULATOR CONTROLLER OFF-LINE CURRENT MODE	
1842	5962-8670401
1843	5962-8670402
1844	5962-8670403
1845	5962-8670404
PULSE WIDTH MODULATOR CURRENT MODE	
1847	/70202
1847	5962-8680602
PULSE WIDTH MODULATOR REGULATING	
1525A	5962-8951101
1524B	5962-8764501
1524	/12601
1524	5962-7802801
1526	5962-8551501
1525A	/12602
1526A	5962-8551502
1527A	5962-8951102
1524A	5962-8764502
UC1525A	5962-8951103
1526	/12603
UC1527A	5962-8951104
1527A	/12604
VOLT. REFERENCE PROGRAMMABLE	
431	5962-8410901
VOLT. REGULATOR	
1532	5962-8777001
VOLT. REGULATOR 12V 1.0A LOW DROPOUT	
LM2940K-12	5962-9088401
VOLT. REGULATOR 15V 1.0A LOW DROPOUT	
LM2940K-15	5962-9088501
VOLT. REGULATOR 8V 1.0A LOW DROPOUT	
LM2940K-8	5962-9088301
VOLT. REGULATOR ADJ.	
LP2951	5962-3870501
VOLT. REGULATOR ADJ. NEGATIVE	
LM104	5962-8760501
LM137	5962-7703403
LT137A	5962-7703406
79MG	/11801
79G	/11802
LM137H	/11803
LM137K	/11804
VOLT. REGULATOR ADJ. NEGATIVE 3.0A	
LT1033	5962-8774101
VOLT. REGULATOR ADJ. NEGATIVE HIGH VOLTAGE	
LM137HV	5962-7703404
LT137AHV	5962-7703408

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Industry P/N	Military* PN
VOLT. REGULATOR ADJ. POSITIVE	
723	/10201
LM117	5962-7703401
(SEE DWG)	5962-8952001
78MG	/11701
78G	/11702
LM117H	/11703
LM117K	/11704
LM105	5962-8958801
LT117A	5962-7703405
LM138K	/11706
VOLT. REGULATOR ADJ. POSITIVE 1.0A	
(SEE DWG)	5962-8998101
VOLT. REGULATOR ADJ. POSITIVE 2.0A	
(SEE DWG)	5962-8864601
VOLT. REGULATOR ADJ. POSITIVE 3.0A	
150	5962-8767501
150	5962-8767502
LM150K	/11705
VOLT. REGULATOR ADJ. POSITIVE 5.0A	
(SEE DWG)	5962-8952101
VOLT. REGULATOR ADJ. POSITIVE HIGH VOLTAGE	
LM117HV	5962-7703402
LT117AHV	5962-7703407
VOLT. REGULATOR DUAL TRACKING	
4194	5962-7705401
VOLT. REGULATOR DUAL POLARITY TRACKING	
1568	5962-8876301
VOLT. REGULATOR DUAL POLARITY TRACKING WITH BALANCE ADJUST	
1568	5962-8876302
VOLT. REGULATOR FIXED DUAL +12V AND -12V OUTPUT	
OM7505SC	5962-8949006
VOLT. REGULATOR FIXED DUAL +12V AND -15V OUTPUT	
OM7506SC	5962-8949007
VOLT. REGULATOR FIXED DUAL +12V AND -5V OUTPUT	
OM7504SC	5962-8949005
VOLT. REGULATOR FIXED DUAL +15V AND -12V OUTPUT	
OM7508SC	5962-8949009
VOLT. REGULATOR FIXED DUAL +15V AND -15V OUTPUT	
OM7509SC	5962-8949001
VOLT. REGULATOR FIXED DUAL +15V AND -5V OUTPUT	
OM7507SC	5962-8949008
VOLT. REGULATOR FIXED DUAL +5V AND -12V OUTPUT	
OM7502SC	5962-8949003
VOLT. REGULATOR FIXED DUAL +5V AND -15V OUTPUT	
OM7503SC	5962-8949004
VOLT. REGULATOR FIXED DUAL +5V AND -5V OUTPUT	
OM7501SC	5962-8949002
VOLT. REGULATOR FIXED NEGATIVE -12V 1.0A	
7912A	5962-8874701
VOLT. REGULATOR FIXED NEGATIVE -15V 1.0A	
7915A	5962-8874801
VOLT. REGULATOR FIXED NEGATIVE -5V 1.0A	
7905A	5962-8874601
VOLT. REGULATOR FIXED NEGATIVE 0.5A 1.0A	
79M05	/11501
LM120H-05	5962-7704001
LM120H-12	5962-7704003
79M12	/11502
LM120H-15	5962-7704004
79M15	/11503
LM120H-24	5962-7704005
79M24	/11504
7905	/11505
7912	/11506
7915	/11507
7924	/11508
VOLT. REGULATOR FIXED NEGATIVE 24V 1.0A	
7924A	5962-8874901
VOLT. REGULATOR FIXED NEGATIVE 8V	
7908A	5962-8987001
VOLT. REGULATOR FIXED POSITIVE	
78M05	/10702
78M12	/10703
78M15	/10704
78M24	/10705
7805	/10706
7812	/10707
7815	/10708
7824	/10709
VOLT. REGULATOR FIXED POSITIVE 1.0A	
7805A	5962-8778201
7812A	5962-8777601
VOLT. REGULATOR FIXED POSITIVE 15V 1.0A	
7815A	5962-8855301
VOLT. REGULATOR FIXED POSITIVE 24V 1.0 A	
7824A	5962-8855401
VOLT. REGULATOR FIXED POSITIVE 5V	
LM109	/10701
LM109	5962-8777401
LM123	5962-8777501
VOLT. REGULATOR FIXED POSITIVE 5V 5A	
LT1003	5962-8987301
VOLT. REGULATOR FIXED POSITIVE 6V 1.0A	
7806A	5962-8962601
VOLT. REGULATOR FIXED POSITIVE 8V 1.0A	
7808A	5962-8962801
VOLT. REGULATOR FIXED POSITIVE LOW DROPOUT 5V 1.0A	
LM2940-5.0	5962-8958701
VOLT. REGULATOR HIGH EFFICIENCY	
1834	5962-8774201
VOLT. REGULATOR HIGH-POWER SWITCHING WITH INTERNAL 1.25A SWITCH	
LT1072	5962-9082503
LT1072HV	5962-9082506
VOLT. REGULATOR HIGH-POWER SWITCHING WITH INTERNAL 2.5A SWITCH	
LT1071	5962-9082502
LT1071HV	5962-9082505
VOLT. REGULATOR HIGH-POWER SWITCHING WITH INTERNAL 5A SWITCH	
LT1070	5962-9082501
LT1070HV	5962-9082504
VOLT. REGULATOR SWITCHING	
LM1578	5962-8958601
LM1578A	5962-8958602
VOLT. REGULATOR SWITCHING SUBSYSTEM	
78S40	5962-8876101
VOLT. REGULATOR/COMPARATOR MICROPOWER	
LT1020	5962-9084101

Drivers/receivers 13/

Industry P/N	Military* PN
BUFFER/DRIVER AND HEX 2-INPUT	
54ALS808	5962-8869501
BUFFER/DRIVER HEX INVERTING WITH COMMON ENABLES AND THREE-STATE OUTPUTS	
54HC366	/65707
54HC366	5962-8682801
BUFFER/DRIVER NAND HEX 2-INPUT	
54ALS804	5962-8869301
BUFFER/DRIVER NOR HEX 2-INPUT	
54ALS805A	5962-8869401
BUFFER/DRIVER OCTAL INVERTING WITH THREE-STATE OUTPUTS	
54AC540	5962-8769501
54AC540	/75710
BUFFER/DRIVER OCTAL INVERTING WITH THREE-STATE OUTPUTS TTL-COMPATIBLE	
54ACT240	5962-8775901
BUFFER/DRIVER OCTAL WITH OPEN COLLECTOR OUTPUTS	
54BCT760	5962-9093801
BUFFER/DRIVER OR HEX 2-INPUT	
54ALS832	5962-8414501
BUFFER/LINE DRIVE OCTAL WITH THREE-STATE OUTPUTS	
54BCT241	5962-9074301
BUFFER/LINE DRIVER HEX NONINVERTING THREE-STATE TTL-COMPATIBLE INPUTS	
54HCT367	5962-9070601
BUFFER/LINE DRIVER/MOS DRIVER OCTAL WITH INVERTED THREE-STATE OUTPUTS	
54BCT2240	5962-9093901
BUFFER/LINE/MOS DRIVER OCTAL WITH THREE-STATE OUTPUTS	
54BCT2244	5962-9074101
BUS CONTROLLER DUAL REDUNDANT RTU	
BUS-65600	5962-8858501
BUS DRIVER 10-BIT NONINVERTING	
54FCT827A	5962-8950601
54FCT827B	5962-8950602
BUS DRIVER HEX	
54LS368	/32204
BUS DRIVER HEX NTDS	
MOH0268D	5962-8858101
BUS DRIVER LATCHING INVERTING OCTAL	
82C83	5962-8406702
BUS DRIVER LATCHING OCTAL	
82C82	5962-8406701
BUS TRANCEIVER OCTAL	
54BCT623	5962-9094001
BUS TRANSCEIVER	
UT63M105	5962-8864401
UT63M107	5962-8864402
UT63M115	5962-8864403
UT63M117	5962-8864404
BUS TRANSCEIVER AND REGISTER OCTAL WITH THREE-STATE OUTPUTS	
54AS646	5962-8759501
BUS TRANSCEIVER 10-BIT BIDIRECTIONAL WITH THREE-STATE OUTPUTS	
29861A	5962-8860401
BUS TRANSCEIVER 10-BIT NONINVERTING TTL-COMPATIBLE	
54FCT861A	5962-8953301
54FCT861B	5962-8953302
BUS TRANSCEIVER 10-BIT HIGH PERFORMANCE	
29C861	5962-8770401
29C961	5962-8770403
BUS TRANSCEIVER 8-BIT NONINVERTING	
54FCT645	5962-8865301
BUS TRANSCEIVER 8-BIT WITH PARITY TTL-COMPATIBLE	
54FCT833A	5962-8973101
54FCT833B	5962-8973102
BUS TRANSCEIVER 9-BIT BIDIRECTIONAL WITH THREE-STATE OUTPUTS	
29863A	5962-8860402
BUS TRANSCEIVER 9-BIT HIGH PERFORMANCE	
29C863	5962-8770402
29C963	5962-8770404

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MILITARY PARTS SORTED BY FUNCTION

Industry P/N	Military* PN
BUS TRANSCEIVER 9-BIT NONINVERTING	
54FCT863A	5962-8866101
54FCT863B	5962-8866102
BUS TRANSCEIVER DIFFERENTIAL RS-485	
DS16F95	5962-8961501
BUS TRANSCEIVER DUAL	
UT63M125	5962-8864405
UT63M127	5962-8864406
UT63M135	5962-8864407
UT63M137	5962-8864408
BUS TRANSCEIVER DUAL ASYNCHRONOUS	
88C681	5962-8953201
88C681	5962-8953202
BUS TRANSCEIVER DUAL CHANNEL	
BUS-63125	5962-8757901
BUS TRANSCEIVER DUAL CHANNEL LOW-POWER	
BUS-63125II	5962-8757902
ARX2411	5962-8757903
ARX3411	5962-8757904
NHI-1500	5962-8757905
FC1553623	5962-8757906
CT1487D	5962-8757907
BUS TRANSCEIVER DUAL CHANNEL MIL-STD-1553 5V	
BUS-63147	5962-8952201
2453	5962-8952202
NHI-1529	5962-8952203
BUS-63148	5962-8952204
CT2521	5962-8952205
FC1553921	5962-8952206
FC1553923	5962-8952207
3453	5962-8952208
BUS TRANSCEIVER DUAL RS232	
LT1081	5962-8766602
BUS TRANSCEIVER DUAL RS232 WITH SHUTDOWN	
LT1080	5962-8766601
BUS TRANSCEIVER HIGH PERFORMANCE CMOS PARITY	
29C855	5962-8857302
29C833A	5962-8857304
BUS TRANSCEIVER HIGH PERFORMANCE CMOS PARITY WITH LATCH OPTION	
29C853A	5962-8857303
BUS TRANSCEIVER HIGH PERFORMANCE CMOS PARITY WITH PARITY LOGIC DEFAULT	
29C853	5962-8857301
BUS TRANSCEIVER INTERFACE TRAPEZOIDAL-WAVEFORM	
55ALS056	5962-9062801
55ALS057	5962-9062901
BUS TRANSCEIVER OCTAL	
82C86H-5	5962-8757701
BUS TRANSCEIVER OCTAL BIDIRECTIONAL WITH 8-BIT PARITY GENERATOR/CHECKER	
54F657	5962-8953501
BUS TRANSCEIVER OCTAL BIDIRECTIONAL WITH INVERTING THREE-STATE OUTPUTS	
2946	5962-8672302
BUS TRANSCEIVER OCTAL BIDIRECTIONAL WITH NONINVERTING THREE-STATE OUTPUTS	
2947	5962-8672301
BUS TRANSCEIVER OCTAL BIDIRECTIONAL WITH THREE-STATE INPUTS/OUTPUTS	
54AC245	/75503
54AC245	5962-8775801
BUS TRANSCEIVER OCTAL BIDIRECTIONAL WITH THREE-STATE OUTPUTS	
54ACT11245	5962-8766302
54AC640	/75506
54F545	/34804
54AC643	/75507
BUS TRANSCEIVER OCTAL BIDIRECTIONAL WITH THREE-STATE OUTPUTS TTL-COMPATIBLE	
54ACT245	5962-8766301
BUS TRANSCEIVER OCTAL GENERAL PURPOSE INTERFACE	
55ALS161	5962-8968101
BUS TRANSCEIVER OCTAL NONINVERTING WITH THREE-STATE OUTPUTS	
54AC623	/75505
BUS TRANSCEIVER OCTAL BIDIRECTIONAL INVERTING TTL-COMPATIBLE	
54FCT640	5962-8865401
54FCT640A	5962-8865402
BUS TRANSCEIVER OCTAL GENERAL PURPOSE INTERFACE	
55ALS160	5962-8968001
BUS TRANSCEIVER OCTAL INVERTING	
82C87H-5	5962-8757702
8287	5962-8686802
BUS TRANSCEIVER OCTAL INVERTING OUTPUTS	
54BCT640	5962-9075201
BUS TRANSCEIVER OCTAL INVERTING 3-STATE TTL COMPATIBLE INPUTS	
54HCT640	5962-8974001
BUS TRANSCEIVER OCTAL INVERTING WITH OPEN-COLLECTOR OUTPUTS	
54LS642	5962-8974801
BUS TRANSCEIVER OCTAL INVERTING WITH THREE-STATE OUTPUTS	
54ALS640A	/38501
54HC640	5962-8780901
54ALS640A	5962-8872701
54HC640	/65506
BUS TRANSCEIVER OCTAL NONINVERTING	
8286	5962-8686801
54FCT645A	5962-8865302
BUS TRANSCEIVER OCTAL NONINVERTING WITH THREE-STATE OUTPUTS	
54F245	5962-8551101
54ALS645A	5962-8403301
54HC245	5962-8408501
54HCT245	5962-8550601
54ALS652	5962-8857301
54HC245	/65503
54F245	/34803
54ALS645A	/38505
54HCT245	/65553
BUS TRANSCEIVER OCTAL NONINVERTING WITH THREE-STATE OUTPUTS TTL-COMPATIBLE	
54FCT245	5962-8762901
54FCT245A	5962-8762902
BUS TRANSCEIVER OCTAL WITH INVERTING OUTPUTS	
54BCT520A	5962-9075001
BUS TRANSCEIVER OCTAL WITH OPEN-COLLECTOR NONINVERTING OUTPUTS	
54F621	5962-9050602
BUS TRANSCEIVER OCTAL WITH OPEN-COLLECTOR OUTPUTS	
54ALS641	/38502
54ALS642	/38503
BUS TRANSCEIVER OCTAL WITH REGISTERS	
54F544	5962-8955501
54LS648	/32805
BUS TRANSCEIVER OCTAL WITH THREE-STATE INVERTING OUTPUTS	
54F620	5962-8946601
BUS TRANSCEIVER OCTAL WITH THREE-STATE NONINVERTING OUTPUTS	
54F623	5962-9050601
BUS TRANSCEIVER OCTAL WITH THREE-STATE OUTPUTS	
54BCT543	5962-9087001
54HC623	5962-8998901
54AS640	5962-8955301
54ALS1245A	5962-8873701
54LS640	5962-8416101
54HCT540	/65760
54ALS245A	5962-8403001
54LS245	5962-8002101
54LS245	/32803
54LS646	/32804
54BCT245	5962-9051401
54ALS643	/38504
54HC643	/65507
54HC648	/65509
BUS TRANSCEIVER PARITY	
AM29855A	5962-9051303
BUS TRANSCEIVER PARITY WITH LATCH OPTION	
AM29853A	5962-9051302
BUS TRANSCEIVER PARITY WITH REGISTER OPTION	
AM29833A	5962-9051301
BUS TRANSCEIVER QUAD	
26S12	5962-8753401
26S10	5962-8672001
26S12A	5962-8753402
BUS TRANSCEIVER QUAD 2-INPUT	
2905	/44101
2906	/44102
2915	/44104
BUS TRANSCEIVER QUAD BIDIRECTIONAL WITH THREE-STATE OUTPUTS	
54HC243	5962-8409001
54HC243	/65502
BUS TRANSCEIVER QUAD INVERTING WITH THREE-STATE OUTPUTS	
54LS242	5962-8002001
54HC242	/65501
54F242	/34801
54LS242	/32801
BUS TRANSCEIVER QUAD NONINVERTING WITH THREE-STATE OUTPUTS	
54F243	5962-8683401
54LS243	/32802
54F243	/34802
54LS243	5962-8002002
BUS TRANSCEIVER QUAD WITH INTERFACE LOGIC AND 2.0V INPUT RECEIVER THRESHOLD	
2907	5962-8770701
2907	/44103
BUS TRANSCEIVER QUAD WITH INTERFACE LOGIC AND THREE-STATE OUTPUTS	
2917A	5962-8671401
BUS TRANSCEIVER QUAD WITH THREE-STATE OUTPUTS	
54ALS242B	5962-8401301
54ALS243A	5962-8401302
2916	/44105
2917	/44106
54ALS242B	/38506
54ALS243A	/38507
BUS TRANSCEIVER UART	
1854	5962-7901701
BUS TRANSCEIVER/RECEIVER OCTAL WITH THREE-STATE OUTPUTS	
54FCT646	5962-8877501
54FCT646A	5962-8877502
BUS TRANSCEIVER/REGISTER	
54F646	5962-8975401
BUS TRANSCEIVER/REGISTER INVERTED	
54F648	5962-8975402
BUS TRANSCEIVER/REGISTER OCTAL INVERTING WITH 3-STATE AND OPEN-COLLECTOR OUTPU	
54ALS653	5962-8968701
BUS TRANSCEIVER/REGISTER OCTAL INVERTING WITH THREE-STATE OUTPUTS	
54AS651	5962-8875301
54ALS648	5962-9052301
BUS TRANSCEIVER/REGISTER OCTAL NONINVERTING WITH THREE-STATE OUTPUTS	
54ALS646	5962-8995601
54AS652	5962-8868701
BUS TRANSCEIVER/REGISTER OCTAL WITH THREE-STATE OUTPUTS	
54HC646	5962-8688501
54BCT652	5962-9155301
54AC648	/75509
54HC646	/65508
BUS TRANSCEIVER/REGISTERS OCTAL WITH THREE-STATE OUTPUTS	
54BCT646	5962-9155501
BUS/MOS MEMORY DRIVER 10-BIT WITH INVERTED 3-	

*Part numbers beginning with a slash "/" are MIL-M-38510 numbers. All others are DESC drawing numbers.

MILITARY PARTS SORTED BY FUNCTION

Function	Industry P/N	Military* PN
STATE OUTPUTS	54BCT2828A	5962-9074501
BUS/MOS MEMORY DRIVER 10-BIT WITH THREE-STATE OUTPUTS	54BCT2827A	5962-9074401
CLOCK DRIVER MOS DUAL	MMH0026	/03501
	0026	5962-7800802
CLOCK DRIVER MOS DUAL WITH VBB CONNECTION	0056	5962-7800801
CLOCK GENERATOR/DRIVER	8224	/42201
CLOCK GENERATOR/DRIVER 25 MHZ	82C84A	5962-8406801
	82C84A	5962-8406802
COLUMN DRIVER ELECTRO-LUMINESCENT	55553	5962-8605501
	55554	5962-8605502
DISPLAY DRIVER AC PLASMA (LINE SELECT)	55500	5962-8601801
DISPLAY DRIVER AC PLASMA (MATRIX-ADDRESSABLE)	55501	5962-8601802
DRIVER 4-BIT LATCHED	UCS-5800	5962-8764002
DRIVER 8-BIT LATCHED	UCS-5801	5962-8764001
DRIVER DUAL HIGH-POWER MOSFET	TSC4423	5962-8850304
	TSC4424	5962-8850305
	TSC4425	5962-8850306
DRIVER DUAL HIGH-SPEED INVERTING	SG1626	5962-8871601
DRIVER DUAL POWER MOS-FET	TSC426	5962-8850301
	TSC427	5962-8850302
	TSC428	5962-8850303
DRIVER DUAL POWER MOS-FET WITH LATCH PROOF OUTPUTS FOR INDUCTIVE LOADS	TSC4426	5962-8850307
	TSC4427	5962-8850308
	TSC4428	5962-8850309
DRIVER HIGH VOLTAGE 1.5A	0006	5962-8761701
DRIVER HIGH VOLTAGE HIGH CURRENT 3.0A	0008	5962-8761702
DRIVER INVERTING POWER MOSFET	TSC429	5962-8877001
	TSC4429	5962-8877002
DRIVER MOSFET DUAL POWER	ICL7667	5962-8766001
DRIVER NONINVERTING POWER MOSFET	TSC4420	5962-8877003
DRIVER-RECEIVER (UNIVERSAL TRANSCEIVER) SINGLE CHANNEL LOW POWER	NHI-1551	5962-9208501
	ARX-4451	5962-9208502
	ARX-4418	5962-9208503
	NHI-1515	5962-9208504
DRIVER-RECEIVER DUAL CHANNEL LOW-POWER	BUS-63127II	5962-8982601
	ARX3419	5962-8982602
	NHI-1502	5962-8982603
	NHI-1523	5962-8982604
	FC1553721	5962-8982605
	CT1589D	5962-8982606
	MR63125MFR	5962-8757908
DRIVER-RECEIVER DUAL CHANNEL RECEIVER IDLE NORMALLY HIGH	ARX3416	5962-8944701
	NHI-1501	5962-8944702
	FC1553622	5962-8944703
	BUS63135II	5962-8944704
DRIVER-RECEIVER LOW POWER	FC155391	5962-8979901
	FC155392	5962-8979902
DRIVER-RECEIVER SINGLE CHANNEL (INTERFACES WITH MANCHESTER ENCODER-DECODER)	BUS-63105	5962-8604901
	ARX2402	5962-8604903
	ARX3402	5962-8604904
	BUS-8553	5962-8604905
	NHI-1509	5962-8604906
	FC155361	5962-8604907
DRIVER-RECEIVER SINGLE CHANNEL (MIL-STD-1553 A AND B) LOW POWER	NHI-1514	5962-9174901
	BUS63104II	5962-9174904
	3231	5962-9174905
	4407	5962-9174908
DRIVER-RECEIVER SINGLE CHANNEL (MIL-STD-1553 A AND B) RECEIVER STANDBY HIGH	3231	5962-8959201
	3231	5962-8959203
DRIVER-RECEIVER SINGLE CHANNEL (MIL-STD-1553 A AND B) RECEIVER STANDBY LOW	ARX3467	5962-8959205
DRIVER-RECEIVER SINGLE CHANNEL (RECEIVER IDLE NORMALLY HIGH)	FC155372	5962-9082902
	ARX3424	5962-9082904
	NHI-1545	5962-9082906
	CT1589MI	5962-9082908
DRIVER-RECEIVER SINGLE CHANNEL (RECEIVER IDLE NORMALLY LOW)	FC155371	5962-9082901
	ARX3420	5962-9082903
	NHI-1531	5962-9082905
	CT1589M	5962-9082907
DRIVER-RECEIVER SINGLE CHANNEL (UNIVERSAL TRANSCEIVER) LOW POWER	NHI-1513	5962-9174902
	BUS63102II	5962-9174903
	3232	5962-9174906
	3232	5962-9174907
	4404	5962-9174909
DRIVER-RECEIVER SINGLE CHANNEL (UNIVERSAL TRANSCEIVER) RECEIVER STANDBY HIGH	3232	5962-8959202
	3232	5962-8959204
DRIVER-RECEIVER SINGLE CHANNEL (UNIVERSAL TRANSCEIVER) RECEIVER STANDBY LOW	ARX3464	5962-8959206
DRIVER-RECEIVER SINGLE CHANNEL (INTERFACES WITH MANCHESTER ENCODER-DECODER)	BUS-63105II	5962-8604902
DRIVER/RECEIVER TRIPLE RS-232	(SEE DWG)	5962-8875102
DRIVER/RECEIVER TRIPLE RS-232 WITH SHUTDOWN AND BIAS	(SEE DWG)	5962-8875101
DYNAMIC MEMORY DRIVER OCTAL WITH THREE-STATE OUTPUTS AND INVERTING DRIVERS	2965	5962-8670701
DYNAMIC MEMORY DRIVER OCTAL WITH THREE-STATE OUTPUTS AND NONINVERTING DRIVERS	2966	5962-8670702
LATCHED DRIVER 8-BIT SERIAL-INPUT 100V OUTPUT	UCS5822	5962-8764101
LINE DRIVER ARINC BUS INTERFACE	HI-8382	5962-8687901
LINE DRIVER DUAL	55121	5962-8776901
	55110A	5962-8754701
LINE DRIVER DUAL 4-INPUT NAND	54S140	/08101
LINE DRIVER DUAL DIFFERENTIAL	55113	5962-8874401
	55114	/10403
LINE DRIVER DUAL DIFFERENTIAL RS-422 PARTY LINE/QUAD SINGLE ENDED RS-423	26LS30	5962-8672101
LINE DRIVER DUAL DIFFERENTIAL CMOS-COMPATIBLE	78C120	5962-8963001
LINE DRIVER DUAL DIFFERENTIAL HIGH-SPEED	9638	5962-8754601
LINE DRIVER DUAL DIFFERENTIAL TS	55113	/10405
LINE DRIVER OCTAL WITH NONINVERTING THREE-STATE OUTPUTS	54BCT541	5962-9074901
LINE DRIVER OCTAL WITH INVERTING THREE-STATE OUTPUTS	54BCT540	5962-9074801
LINE DRIVER OCTAL WITH THREE-STATE OUTPUTS	54BCT244	5962-9062501
LINE DRIVER QUAD	55188	5962-8688901
LINE DRIVER QUAD DIFFERENTIAL	26C31	5962-9163901
LINE DRIVER QUAD DIFFERENTIAL HIGH SPEED	26LS31	5962-7802301
	26F31	5962-7802302
LINE DRIVER QUAD DIFFERENTIAL RS-485 COMPARABLE	96F172	5962-9076501
	96F174	5962-9076502
LINE DRIVER QUAD DIFFERENTIAL WITH THREE-STATE OUTPUTS	55ALS194	5962-8864801
LINE DRIVER QUAD RS423 WITH THREE-STATE OUTPUTS	26LS29	5962-8767001
LINE DRIVER/RECEIVER DUAL DIFFERENTIAL	7832	5962-8004102
	7832	/10407
LINE DRIVER/RECEIVER DUAL DIFFERENTIAL W/OUTPUT DIODE CLAMPING	7831	5962-8004101
	7831	/10406
LINE RECEIVER DUAL	9627	5962-8978701
	9622	5962-8752201
	55107	/10401
LINE RECEIVER DUAL DIFFERENTIAL	7820A	5962-7900801
	55115	5962-8874501
	55183	5962-7900901
	9637A	5962-8752401
	55115	/10404
LINE RECEIVER DUAL DIFFERENTIAL PROGRAMMABLE SLEW RATE	9636A	5962-8752301
LINE RECEIVER DUAL OC	55108	/10402
LINE RECEIVER HEX NTDS	MOH0272C	5962-8858201
LINE RECEIVER QUAD	55189	5962-8688801
	55189A	5962-8688802
LINE RECEIVER QUAD DIFFERENTIAL	26LS32	5962-7802001
	26LS32B	5962-8761601
	10H515	5962-8750101
	26LS34	5962-8759601
	26LS33	5962-7802002
	26C32	5962-9164001
	26LS32A	5962-7802003
	26LS33A	5962-7802004
	26F32	5962-7802005

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MILITARY PARTS SORTED BY FUNCTION

Industry P/N	Military* PN
LINE RECEIVER QUAD DIFFERENTIAL RS-485	
96F175	5962-9076601
96F173	5962-9076602
LINE RECEIVER QUAD DIFFERENTIAL WITH THREE-STATE OUTPUTS	
55ALS195	5962-8864901
LINE RECEIVER QUINT DIFFERENTIAL	
100314	5962-9162901
LINE RECEIVER TRIPLE	
10H516	5962-8750201
LINE RECEIVER TRIPLE DIFFERENTIAL WITH COMMON RESET	
10516	5962-7800901
LINE TRANSCEIVER DIFFERENTIAL WITH THREE-STATE RECEIVER OUTPUT CIRCUITRY	
55116	5962-8851101
55117	5962-8851102
55118	5962-8851103
55119	5962-8851104
NAND DRIVER QUAD 2-INPUT 30 OHM	
54F3037	5962-9056501
NAND DRIVER QUAD HIGH-OUTPUT VOLTAGE AND CURRENT	
UH-507	5962-8986701
NTDS FAST DRIVER HEX	
MOF1305D	5962-8858301
OR DRIVER QUAD 2-INPUT HIGH-OUTPUT VOLTAGE AND CURRENT	
UH502	5962-8856401
OUTPUT DRIVER DUAL	
UC1706	5962-8961101
PERIPHERAL DRIVER DUAL AND	
55451	/12902
55461	/12907
PERIPHERAL DRIVER DUAL AND CMOS COMPATIBLE WITH OPEN COLLECTOR OUTPUTS	
DS1631	5962-8863101
PERIPHERAL DRIVER DUAL NAND	
55450	/12901
55452	5962-7704901

Industry P/N	Military* PN
55452	/12903
55460	/12906
55462	/12908
PERIPHERAL DRIVER DUAL NAND CMOS COMPATIBLE OPEN COLLECTOR	
DS1632	5962-9052201
PERIPHERAL DRIVER DUAL NOR	
55454	5962-8871501
55464	5962-8871502
55474	5962-8871503
55454	/12905
55464	/12910
PERIPHERAL DRIVER DUAL NOR CMOS-COMPATIBLE OPEN-COLLECTOR OUTPUTS	
DS1634	5962-8982101
PERIPHERAL DRIVER DUAL OR	
55453	/12904
55463	/12909
PI-BUS TRANSCEIVER OCTAL BIDIRECTIONAL LATCHED	
54F776	5962-8870701
POWER DRIVER AND QUAD 2-INPUT	
UH-508	5962-8550001
POWER DRIVER DUAL-CHANNEL	
UC1707	5962-8761901
POWER DRIVER NOR QUAD 2-INPUT 100V	
UH-532	5962-8960403
POWER DRIVER NOR QUAD 2-INPUT 40V	
UH-432	5962-8960401
POWER DRIVER NOR QUAD 2-INPUT 70V	
UH-432-1	5962-8960402
POWER DRIVER OR QUAD 2-INPUT	
UH503	5962-8855101
RECEIVER TRANSMITTER UNIVERSAL ASYNCHRONOUS 2.0 MHZ	
HD-6402R	5962-9052501
RECEIVER TRANSMITTER UNIVERSAL ASYNCHRONOUS 8.0 MHZ	
HD-6402B	5962-9052502
RECEIVER QUAD NTDS FAST/ANEW	
MOR1623K	5962-8858401

Industry P/N	Military* PN
RECEIVER/TRANSMITTER DUAL ASYNCHRONOUS	
2681	5962-8856601
68C681	5962-8953203
88681	5962-8856603
RECEIVER/TRANSMITTER DUAL ASYNCHRONOUS WITH 7-BIT INPUT AND 8-BIT OUTPUT PORTS	
2681	5962-8856602
REGISTERED TRANSCEIVER BIDIRECTIONAL I/O PORTS NONINVERTING 8-BIT	
2952A	5962-8777201
REGISTERED TRANSCEIVERS OCTAL WITH THREE-STATE OUTPUTS	
54BCT544	5962-9155401
REMOTE TERMINAL UNIT DUAL REDUNDANT	
BUS-65142	5962-8979801
BUS-65143	5962-8979802
REMOTE TERMINAL UNIT LOW POWER DUAL REDUNDANT	
BUS-65111	5962-8763201
REMOTE TERMINAL MIL-STD-1553B	
(SEE DWG)	5962-9168701
(SEE DWG)	5962-9168702
ROW DRIVER ELECTROLUMINESCENT	
55551	5962-8605401
55563A	5962-9081301
55552	5962-8605402
55564A	5962-9081302
SOURCE DRIVER HIGH CURRENT	
UDS2981	5962-8851901
UDS2983	5962-8851902
TRANSCEIVER 8-BIT OCTAL LATCHED NONINVERTING WITH TS OUTPUTS TTL-COMPATIBLE	
54FCT543	5962-8973001
54FCT543A	5962-8973002
TRANSCEIVER DUAL CHANNEL MIL-STD-1553 Ò5V	
MR63147M	5962-9206101
TRANSCEIVER DUAL RS-232	
LT1181	5962-9172902
TRANSCEIVER DUAL RS-232 WITH SHUTDOWN	
LT1180	5962-9172901
TRANSCEIVER DUAL RS232	

Industry P/N	Military* PN
(SEE DWG)	5962-8987701
TRANSCEIVER/REGISTER OCTAL WITH THREE-STATE OUTPUTS	
54F652	5962-8955801
54AC646	5962-8968201
54AC646	/75508
TRANSISTOR ARRAY	
3045	/10802
2005	/14105
TRANSISTOR ARRAY DARLINGTON	
2001	/14101
2002	/14102
2003	/14103
2004	/14104
2801	/14106
2802	/14107
2804	/14109
2805	/14110
TRANSISTOR ARRAY DARLINGTON EIGHT-GATE	
2803	5962-8805801
2803	/14108
TRANSLATOR/RECEIVER/DRIVER HEX PROGRAMMABLE	
LTC1045	5962-9054501
TRANSMISSION LINE/BACKPLANE TRANSCEIVER OCTAL 30-OHM NONINVERTING	
54F30245	5962-8972201

Timers 14/

Industry P/N	Military* PN
TIMER DUAL PRECISION	
TLC556	5962-8950302
556	/10902
TLC556	/14902
TIMER DUAL LOW-POWER PRECISION	
7556	5962-8950304
7556	/14904
TIMER LOW-POWER PRECISION	
7555	5962-8950303
7555	/14903
555LV	/14905
TIMER PRECISION	
555	/10901
TLC555	/14901
TLC555	5962-8950301
LM122	5962-9163101
555	/10903

Core Drivers 15/

Industry P/N	Military* PN
MEMORY CORE DRIVER DUAL	
55325	/13001
MEMORY CORE DRIVER QUAD	
55326	/13002
55327	/13003

D/A converters 16/

Industry P/N	Military* PN
D/A CONVERTER 10-BIT	
561	/13301
7520	/12702
1020	/12705
D/A CONVERTER 12-BIT	
AD767	5962-8961701
ADH-030	5962-9063401
TDC1112-1	5962-9165201
TDC1112-2	5962-9165202
7521	/12703
565	/12103
566	/12104
1220	/12706
1218	/12707
D/A CONVERTER 12-BIT BINARY INPUT CODE	
DAC-HKB	5962-8952801
D/A CONVERTER 12-BIT BUFFERED	
7545S	5962-8770201
7545T	5962-8770202
7545U	5962-8770203
7545G	5962-8770204
7545B	5962-8770205
7545A	5962-8770206
D/A CONVERTER 12-BIT BUFFERED MULTIPLYING	
(SEE DWG)	5962-8877801
(SEE DWG)	5962-8877802
D/A CONVERTER 12-BIT CURRENT OUTPUT MICROPROCESSOR-COMPATIBLE	
AD567S	5962-8780101
D/A CONVERTER 12-BIT DUAL	
7547S	5962-8965701
7547T	5962-8965702
7547U	5962-8965703
D/A CONVERTER 12-BIT MULTIPLYING	
AD7541AS	5962-8948101
AD7541AT	5962-8948102
PM7541AB	5962-8948103
PM7541AA	5962-8948104
7541	/12704
D/A CONVERTER 12-BIT TWO'S COMPLEMENT	
DAC-HKB-2	5962-8952802
D/A CONVERTER 12-BIT .024	

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Industry P/N	Military* PN
PERCENT ELD	
TDC1012	5962-9059602
D/A CONVERTER 12-BIT .048 PERCENT ELD	
TDC1012	5962-9059601
D/A CONVERTER 12-BIT EXTERNAL REFERENCE 2 MA FS	
562	5962-8100801
562	/12101
D/A CONVERTER 12-BIT HIGH-SPEED	
AD568SQ	5962-8980801
AD568SE	5962-8980802
D/A CONVERTER 12-BIT INTERNAL REFERENCE 2 MA FS	
563	5962-8100802
563	/12102
D/A CONVERTER 12-BIT RANGE PROGRAMMABLE VOLTAGE OUTPUT	
DAC87	5962-8300301
DAC87	/13702
D/A CONVERTER 12-BIT RANGE-PROGRAMMABLE VOLTAGE OUTPUT	
DAC87	/13701
DAC87	5962-8300201
DAC87	/13703
D/A CONVERTER 12-BIT VOLTAGE OUTPUT MICROPROCESSOR COMPATIBLE	
AD667S	5962-8865901
D/A CONVERTER 12-BIT WITH INPUT REGISTER	
MN3860	5962-9057001
D/A CONVERTER 14-BIT DEGLITCHED Ò.006% FSR	
DAC02310-113	5962-8851702
D/A CONVERTER 14-BIT DEGLITCHED Ò.012% FSR	
DAC02310-112	5962-8851701
D/A CONVERTER 16-BIT	
DAC703	5962-8856301
D/A CONVERTER 16-BIT VOLTAGE OUTPUT	
AD7846	5962-8969701
D/A CONVERTER 16-BIT 0 TO +10V AND Ò5V OUTPUT	
DAC-HPB	5962-8953101
D/A CONVERTER 16-BIT 0 TO +10V OUTPUT	
MN3290T/B-V	5962-8953103
D/A CONVERTER 16-BIT 15-BIT LINEARITY	
HS9378SB	5962-8986202
D/A CONVERTER 16-BIT 16-BIT LINEARITY	
HS9378TB	5962-8986201
D/A CONVERTER 16-BIT Ò10V OUTPUT	
DAC-HPB-1	5962-8953102
D/A CONVERTER 16-BIT Ò5V OUTPUT	
MN3291T/B-V	5962-8953104
D/A CONVERTER 8-BIT	
DAC-08	/11301
7523	/12701
DAC-08A	/11302
D/A CONVERTER 8-BIT MULTIPLYING BUFFERED WITH .125 LSB	
7524	5962-8770003
D/A CONVERTER 8-BIT MULTIPLYING BUFFERED WITH .5 LSB	
7524	5962-8770001
D/A CONVERTER 8-BIT VIDEO	
BT102	5962-8965301
D/A CONVERTER 8-BIT -2V TO +2V OUTPUT	
MN3009	5962-8768802
D/A CONVERTER 8-BIT 0V TO +4V OUTPUT	
MN3008	5962-8768801
D/A CONVERTER 8-BIT HIGH-SPEED MULTIPLYING	
DAC08	5962-8993201
D/A CONVERTER 8-BIT MULTIPLYING BUFFERED WITH .25 LSB	
7524	5962-8770002
D/A CONVERTER 8-BIT TRIPLE COLOR-MAPPED VIDEO	
RGBDAC3808H	5962-8950901
D/A CONVERTER 8-BIT VOLTAGE-MODE	
7228T	5962-8866301
7228U	5962-8866302
D/A CONVERTER 8-BIT WITH FULL MICROPROCESSOR INTERFACE	
AD558T	/14401
AD558S	5962-8778901
AD558T	5962-8778902
D/A CONVERTER 8-BIT WITH INPUT REGISTER	
HS3020	5962-8971801
D/A CONVERTER DUAL 12-BIT BUFFERED MULTIPLYING	
DAC8221A	5962-8967101
D/A CONVERTER DUAL 12-BIT DOUBLE-BUFFERED MULTIPLYING	
DAC8222A	5962-8967201
D/A CONVERTER DUAL 12-BIT 8 + 4 LOADING STRUCTURE 11-BIT LINEARITY	
7537S	5962-8776301
D/A CONVERTER DUAL 12-BIT 8 + 4 LOADING STRUCTURE 12-BIT LINEARITY	
7537T	5962-8776302
7537U	5962-8776303
D/A CONVERTER DUAL 12-BIT Ò0.5 LSB	
7549T	5962-8876502
D/A CONVERTER DUAL 12-BIT Ò1.0 LSB	
7549S	5962-8876501
D/A CONVERTER DUAL 8-BIT BUFFERED Ò1 LSB'S OF GAIN ERROR	
7528	5962-8770103
D/A CONVERTER DUAL 8-BIT BUFFERED Ò2 LSB'S OF GAIN ERROR	
7528	5962-8770102
D/A CONVERTER DUAL 8-BIT BUFFERED Ò4 LSB'S OF GAIN ERROR	
7528	5962-8770101
D/A CONVERTER QUAD 12-BIT	
AD390S	5962-8850901
HS9324	5962-8862901
AD390T	5962-8850902
AD394S	5962-8851001
AD394T	5962-8851002
AD395S	5962-8851003
AD395T	5962-8851004
D/A CONVERTER QUAD 8-BIT MULTIPLYING WITH MEMORY	
DAC-8408A	5962-8967801
DAC-8408B	5962-8967802
D/A CONVERTER QUAD 8-BIT WITH OUTPUT AMPLIFIERS	
7226	5962-8780201
D/A CONVERTER TRIPLE 8-BIT WITH 256X24 COLOR PALETTE	
BT458	5962-8992801

A/D Converters
17/

Industry P/N	Military* PN
A/D CONVERTER 10-BIT SAMPLING WITH (8+2) READ INTERFACING STRUCTURE	
AD7579	5962-8969801
A/D CONVERTER 10-BIT SAMPLING WITH A 10-BIT PARALLEL WORD	
AD7580	5962-8969802
A/D CONVERTER 10-BIT WITH MICROPROCESSOR INTERFACE	
AD573S	5962-8850501
A/D CONVERTER 10-BIT WITH THREE-STATE BUFFERED OUTPUTS	
AD571	/13401
AD571	5962-8680202
A/D CONVERTER 12-BIT	
CS5012	5962-8967901
ADC-HX	5962-8850801
CLC925B	5962-9099501
AD9005A	5962-9066601
ADC-HZ	5962-8850802
5207	/12008
5217	/12016
A/D CONVERTER 12-BIT -10V TO +10V EXTERNAL REFERENCE	
MN5205	5962-8958306
5205	/12006
A/D CONVERTER 12-BIT -10V TO +10V INTERNAL REFERENCE	
5202	/12005
MN5202	5962-8958305
A/D CONVERTER 12-BIT -5V TO +5V EXTERNAL REFERENCE	
5204	/12004
MN5204	5962-8958304
A/D CONVERTER 12-BIT -5V TO +5V INTERNAL REFERENCE	
5201	/12003
MN5201	5962-8958303
A/D CONVERTER 12-BIT 0 TO +5V	
MN5245	5962-8959501
A/D CONVERTER 12-BIT 0 TO +5V WITH THREE-STATE OUTPUTS	
MN5245A	5962-8959502
A/D CONVERTER 12-BIT 0V TO -10V EXTERNAL REFERENCE	
MN5203	5962-8958302
5203	/12002
A/D CONVERTER 12-BIT 0V TO -10V INTERNAL REFERENCE	
MN5200	5962-8958301
5200	/12001
A/D CONVERTER 12-BIT 0V TO 10V INTERNAL REFERENCE	
5206	/12007
MN5206	5962-8958307
A/D CONVERTER 12-BIT 1 MHZ Ò2 LSB	
CS5412-TC1	5962-9095701
A/D CONVERTER 12-BIT 1 MHZ Ò3 LSB	
CS5412-SC1	5962-9095702
A/D CONVERTER 12-BIT 11-BIT LINEARITY	
AD7672TQ10	5962-8965501
AD7672TQ05	5962-8965503
A/D CONVERTER 12-BIT 12-BIT LINEARITY	
AD7672UQ10	5962-8965502
AD7672UQ05	5962-8965504
A/D CONVERTER 12-BIT HIGH PERFORMANCE MULTI-CHIP W/MICROPROCESSOR INTERFACE	
674AU	5962-8861501
674AT	5962-8861502
674AU	/14005
674AT	/14006
A/D CONVERTER 12-BIT HIGH PERFORMANCE WITH MICROPROC. INTERFACE AND S/H	
674ZA	5962-9169001
A/D CONVERTER 12-BIT HIGH-SPEED	
AD578SD	5962-8865801
AD578TD	5962-8865802
AD578ZSD	5962-8865803
AD578ZTD	5962-8865804
A/D CONVERTER 12-BIT HIGH-SPEED -10V TO +10V EXTERNAL REFERENCE	
MN5215	5962-8958406
5215	/12014
A/D CONVERTER 12-BIT HIGH-	

*Part numbers beginning with a slash "/" are MIL-M-38510 numbers. All others are DESC drawing numbers.

MILITARY PARTS SORTED BY FUNCTION

Industry P/N	Military* PN
SPEED -10V TO +10V INTERNAL REFERENCE	
MN5212	5962-8958405
5212	/12013
A/D CONVERTER 12-BIT HIGH-SPEED -5V TO +5V EXTERNAL REFERENCE	
MN5214	5962-8958404
5214	/12012
A/D CONVERTER 12-BIT HIGH-SPEED -5V TO +5V INTERNAL REFERENCE	
MN5211	5962-8958403
5211	/12011
A/D CONVERTER 12-BIT HIGH-SPEED 0V TO -10V EXTERNAL REFERENCE	
MN5213	5962-8958402
5213	/12010
A/D CONVERTER 12-BIT HIGH-SPEED 0V TO -10V INTERNAL REFERENCE	
MN5210	5962-8958401
5210	/12009
A/D CONVERTER 12-BIT HIGH-SPEED 0V TO 10 INTERNAL REFERENCE	
MN5216	5962-8958407
5216	/12015
A/D CONVERTER 12-BIT MEDIUM PERFORMANCE WITH MICROPROC. INTERFACE AND S/H	
674ZB	5962-9169002
A/D CONVERTER 12-BIT TRACK/HOLD	
ADC00300	5962-8854201
A/D CONVERTER 12-BIT WITH MICROPROCESSOR INTERFACE	
574AU	/14001
574AU	5962-8512701
574AT	5962-8512702
574AT	/14002
574AU	/14003
574AU	5962-8512703
674BT	5962-9169003
574AT	/14004
574AT	5962-8512704
A/D CONVERTER 12-BIT Ò2.5V	
MN5246	5962-8959503
A/D CONVERTER 12-BIT Ò2.5V WITH THREE-STATE OUTPUTS	
MN5246A	5962-8959504
A/D CONVERTER 14-BIT	
SP9588	5962-9063101
A/D CONVERTER 14-BIT 14.25 Ês	
CS5014-S	5962-8967401
CS5014-T	5962-8967402
A/D CONVERTER 16-BIT	
MN5295	5962-8956901
A/D CONVERTER 16-BIT RESOLUTION	
MN5290	5962-8956301
MN5291	5962-8956302
A/D CONVERTER 16-BIT SAMPLING	
MN6400T	5962-9177001
A/D CONVERTER 16-BIT 100 KHZ	
CS5101A-SD	5962-9169101
CS5101A-TD	5962-9169102
A/D CONVERTER 16-BIT 16.25 Ês	
CS5016-S	5962-8967601
A/D CONVERTER 16-BIT 16.25 Ês	
CS5016-T	5962-8967602
A/D CONVERTER 16-BIT SAMPLING 400 HKZ	
AD1385TD/883	5962-9171201
A/D CONVERTER 16-BIT Ò0.003 %FSR	
HS9576T	5962-9079502
A/D CONVERTER 16-BIT Ò0.006 %FSR	
HS9576S	5962-9079501
A/D CONVERTER 4-BIT VIDEO 25 MSPS	
TDC1044	5962-8982801
A/D CONVERTER 6-BIT FLASH	
TDC1046	5962-8778601
A/D CONVERTER 8-BIT	
TDC1048	5962-8760001
AD9012S	5962-8965401
AD9012T	5962-8965402
A/D CONVERTER 8-BIT FLASH	
IDT75C48S20	5962-8874301
HS1068	5962-8877601
IDT75C48SC30	5962-8874302
A/D CONVERTER 8-BIT FLASH 10 MHZ	
7684T	5962-8977701
7684S	5962-8977702
A/D CONVERTER 8-BIT FLASH 20 MHZ	
MP7684AT	5962-8977703
MP7684AS	5962-8977704
A/D CONVERTER 8-BIT VIDEO	
AD9048T	5962-9092701
AD9048S	5962-9092702
A/D CONVERTER 8-BIT 4-CHANNEL Ò0.5 LSB	
7824U	5962-8876402
A/D CONVERTER 8-BIT 4-CHANNEL Ò1.0 LSB	
7824T	5962-8876401
A/D CONVERTER 8-BIT 8-CHANNEL Ò0.5 LSB	
7828U	5962-8876404
A/D CONVERTER 8-BIT 8-CHANNEL Ò1.0 LSB	
7828T	5962-8876403
A/D CONVERTER 8-BIT FLASH	
SP1078B	5962-8997901
A/D CONVERTER 8-BIT MICROPROCESSOR COMPATIBLE	
ADC0802	5962-9096601
A/D CONVERTER 8-BIT MICROPROCESSOR-COMPATIBLE	
ADC-908A	5962-8961601
ADC-908B	5962-8961602
PM-7574A	5962-8961603
PM-7574B	5962-8961604
A/D CONVERTER 8-BIT WITH INPUT AMPLIFIER	
670S	5962-8763501
A/D CONVERTER 8-BIT WITH MICROPROCESSOR INTERFACE	
AD673S	5962-8850502
A/D CONVERTER 8-BIT WITH SERIAL CONTROL 1.1 MHZ	
TLC549	5962-9084502
A/D CONVERTER 8-BIT WITH SERIAL CONTROL 2.048 MHZ	
TLC548	5962-9084501
A/D CONVERTER 8-BIT WITH THREE-STATE BUFFERED OUTPUTS	
AD570	5962-8680201
A/D CONVERTER 8-BIT WITH TRACK/HOLD	
AD7821	5962-8951801
A/D CONVERTER 8-BIT WITH TRACK/HOLD AMPLIFIER	
7575S	5962-8776201
7575T	5962-8776202
A/D CONVERTER 8-BIT WITH TRACK/HOLD Ò0.5 LSB	
AD7820U	5962-8865001
A/D CONVERTER 8-BIT WITH TRACK/HOLD Ò1.0 LSB	
AD7820T	5962-8865002
A/D CONVERTER 9-BIT	
1049	5962-8853201
A/D CONVERTER HIGH-SPEED	
AD7572S12	5962-8759101
AD7572T12	5962-8759102
AD7572U12	5962-8759103
AD7572S05	5962-8759104
AD7572	5962-8759105
AD7572U05	5962-8759106
VOLT.-TO-FREQUENCY CONVERTER	
AD650	/13803

Analog switches/multiplexers 18/

Industry P/N	Military* PN
ANALOG LATCH CURRENT SENSING WITH DIGITAL RESET	
1549	5962-8684901
ANALOG MULTIPLEXER	
54HC4053	5962-8775401
ANALOG MULTIPLEXER 16-CHANNEL	
506	/19001
4067B	/17801
ANALOG MULTIPLEXER 16-CHANNEL (OVERVOLTAGE PROTECTED)	
MUX-16A	5962-8771701
MUX-16B	5962-8771702
ANALOG MULTIPLEXER 16-CHANNEL LATCHED	
ADG526A	5962-8971001
ANALOG MULTIPLEXER 16-CHANNEL/8-CHANNEL DIFFERENTIAL	
HI-516	5962-8869901
ANALOG MULTIPLEXER 4-CHANNEL DIFFERENTIAL	
MUX-24A	5962-8771801
MUX-24B	5962-8771802
ANALOG MULTIPLEXER 4-CHANNEL WIDEBAND VIDEO	
HI524	5962-8761801
ANALOG MULTIPLEXER 8-CHANNEL	
MUX-08A	5962-8771601
MUX-08B	5962-8771602
ANALOG MULTIPLEXER 8-CHANNEL DIFFERENTIAL	
4097B	/17802
507	/19003
ANALOG MULTIPLEXER 8-CHANNEL LATCHABLE	
DG528	5962-8768901
ANALOG MULTIPLEXER 8-CHANNEL LATCHED	
ADG527A	5962-8971002
ANALOG MULTIPLEXER 8-CHANNEL TTL-COMPATIBLE INPUTS	
54HCT4051	5962-9065401
ANALOG MULTIPLEXER DUAL 4-CHANNEL	
509	/19008
ANALOG MULTIPLEXER/DEMULTIPLEXER 16-CHANNEL WITH OVERVOLTAGE PROTECTION	
506A	5962-8513101
HS-1840RH	5962D8753801
506A	/19002
IH5116	5962-8513104
ANALOG MULTIPLEXER/DEMULTIPLEXER 8-CHANNEL	
(SEE DWG)	5962-7705201
508	/19007
ANALOG MULTIPLEXER/DEMULTIPLEXER 8-CHANNEL DIFFERENTIAL W/ OVERVOLTAGE PROTECT	
507A	5962-8513102
507A	/19004
ANALOG MULTIPLEXER/DEMULTIPLEXER 8-CHANNEL DIFFERENTIAL WITH OVERVOLTAGE PROTE	
IH5216	5962-8513105
ANALOG MULTIPLEXER/DEMULTIPLEXER 8-CHANNEL WITH OVERVOLTAGE PROTECTION	
(SEE DWG)	5962-7705202
(SEE DWG)	5962-7705203
508A	/19005
ANALOG MULTIPLEXER/DEMULTIPLEXER DIFFERENTIAL 4-CHANNEL	

*Part numbers beginning with a slash "/" are MIL-M-38510 numbers. All others are DESC drawing numbers.

MILITARY PARTS
SORTED BY FUNCTION

Industry P/N	Military* PN
4052B	5962-7901501
4052B	5962-7901502
ANALOG MULTIPLEXER/DEMULTIPLEXER DIFFERENTIAL 4-CHANNEL TTL-COMPATIBLE INPUTS	
54HCT4052	5962-9163001
ANALOG MULTIPLEXER/DEMULTIPLEXER DIFFERENTIAL 4-CHANNEL WITH OVERVOLTAGE PROTE	
509A	5962-8513103
509A	/19006
IH5208	5962-8513106
ANALOG MULTIPLEXER/DEMULTIPLEXER DOUBLE-POLE FOUR-POSITION	
54HC4052	5962-8855601
ANALOG MULTIPLEXER/DEMULTIPLEXER FOUR-POLE DOUBLE-THROW	
14551B	5962-8775301
ANALOG MULTIPLEXER/DEMULTIPLEXER TRIPLE 2-CHANNEL	
4053B	5962-8101801
ANALOG SWITCH 4-CHANNEL	
AH5012	5962-9088001
AH5010	5962-9087801
ANALOG SWITCH 4PST 1-CHANNEL 30 OHMS	
HI5047A	5962-8100618
ANALOG SWITCH 4PST 1-CHANNEL 75 OHMS	
IH5047	/10508
IH5047	5962-8100608
HI5047	5962-8100616
ANALOG SWITCH DPDT 1-CHANNEL 30 OHMS	
HI5046A	5962-8100617
ANALOG SWITCH DPDT 1-CHANNEL 75 OHMS	
IH5046	5962-8100607
IH5046	/10507
HI5046	5962-8100615
ANALOG SWITCH DPST 1-CHANNEL 30 OHMS	
DG5144	5962-8100613
ANALOG SWITCH DPST 1-CHANNEL 75 OHMS	
IH5044	5962-8100605
5044	/10505
ANALOG SWITCH DPST 2-CHANNEL	
DG184A	/11103
302	/11603
DG184A	5962-11103BX
DG185A	/11104
DG185A	5962-11104BX
306	/11607
ANALOG SWITCH DPST 2-CHANNEL 30 OHMS	
HI5049	5962-8100620
ANALOG SWITCH DPST 2-CHANNEL 75 OHMS	
5045	/10506
IH5045	5962-8100606
HI5045	5962-8100614
ANALOG SWITCH DUAL DPST	
DG129A	5962-7801401
DG405	5962-8996101
ANALOG SWITCH DUAL SPDT	
DG403	5962-8976301
ANALOG SWITCH DUAL SPST	
DG401	5962-9056901
DG180A	5962-8767301
ANALOG SWITCH QUAD	
54HC4016	5962-8875801
4016A	/05801
ANALOG SWITCH QUAD SPST	
DG411	5962-9073101
DG412	5962-9073102
DG413	5962-9073103
ANALOG SWITCH QUAD SPST JFET	
SW-06B	5962-8966901
ANALOG SWITCH QUAD SPST HIGH-SPEED	
(SEE DWG)	5962-8671601
(SEE DWG)	5962-8671602
ANALOG SWITCH SPDT	
DG187A	5962-11105BX
DG187A	/11105
DG188A	/11106
DG188A	5962-11106BX
ANALOG SWITCH SPDT 1-CHANNEL	
301	/11602
ANALOG SWITCH SPDT 1-CHANNEL 30 OHMS	
HI5050	5962-8100621
ANALOG SWITCH SPDT 1-CHANNEL 75 OHMS	
IH5042	5962-8100603
5042	/10503
DG5142	5962-8100611
ANALOG SWITCH SPDT 2-CHANNEL	
303	/11604
305	/11606
DG190A	/11107
DG190A	5962-11107BX
DG191A	/11108
DG191A	5962-11108BX
307	/11608
ANALOG SWITCH SPDT 2-CHANNEL 30 OHMS	
HI5043	5962-8100612
HI5051	5962-8100622
ANALOG SWITCH SPDT 2-CHANNEL 75 OHMS	
IH5043	5962-8100604
5043	/10504
DG5141	5962-8100610
ANALOG SWITCH SPDT 2-CHANNEL WITH BIPOLAR DRIVE	
DG189	5962-9068901
ANALOG SWITCH SPST 1-CHANNEL 75 OHMS	
HI5040	5962-8100601
5040	/10501
DG5140	5962-8100609
ANALOG SWITCH SPST 2-CHANNEL	
300	/11601
DG181A	5962-11101BX
200	/12301
DG181A	/11101
DG182A	5962-11102BX
DG182A	/11102
304	/11605
ANALOG SWITCH SPST 2-CHANNEL 30 OHMS	
IH5148	5962-8100619
ANALOG SWITCH SPST 2-CHANNEL 75 OHMS	
5041	/10502
HI5041	5962-8100602
ANALOG SWITCH SPST 4-CHANNEL	
54HC4066	5962-8950701
4066A	/05802
201	/12302
4016B	/05851
4066B	/05852
201	5962-7705301
ANALOG SWITCH SPST 4-CHANNEL RF/VIDEO	
IH5352	5962-8875001
BILATERAL SWITCH QUAD	
4016B	5962-9064001
DARLINGTON SWITCH QUAD WITH PRE-DRIVER STAGES	
2069	5962-8753201
2070	5962-8753202
MULTIPLEXER DUAL 8-CHANNEL WITH SAMPLE AND HOLD	
HS362	5962-8956501

Voltage references 19/

Industry P/N	Military* PN
VOLT. REFERENCE	
2700	/13601
2702	/13602
LM199A-20	/12405
VOLT. REFERENCE DIODE	
LM185-1.2	5962-8759401
LM113	5962-8671101
LT1004-1.2	5962-8859701
LM185-2.5	5962-8759402
LM113-1	5962-8671102
LT1004-2.5	5962-8859702
LM185BX1.2	5962-8759403
LM113-2	5962-8671103
LM185BX2.5	5962-8759404
LM185BY1.2	5962-8759405
LM185BY2.5	5962-8759406
VOLT. REFERENCE DIODE 2.5V	
LT1009	5962-8961001
1009VR	/14801
LT1009	/14802
VOLT. REFERENCE 1.8V	
LM103H-1.8	5962-7702801
VOLT. REFERENCE 10V	
LT1021BM-10	5962-8860001
LT1021CM-10	5962-8860002
AD587SQ	5962-8982501
LT1021DM-10	5962-8860003
AD587TQ	5962-8982502
AD587UQ	5962-8982503
102110	/12409
VOLT. REFERENCE 2.0V	
LM103H-2.0	5962-7702802
VOLT. REFERENCE 2.2V	
LM103H-2.2	5962-7702803
VOLT. REFERENCE 2.4V	
LM103H-2.4	5962-7702804
VOLT. REFERENCE 2.7V	
LM103H-2.7	5962-7702805
VOLT. REFERENCE 3.0V	
LM103H-3.0	5962-7702806
VOLT. REFERENCE 3.3V	
LM103H-3.3	5962-7702807
VOLT. REFERENCE 3.6V	
LM103H-3.6	5962-7702808
VOLT. REFERENCE 3.9V	
LM103H-3.9	5962-7702809
VOLT. REFERENCE 4.3V	
LM103H-4.3	5962-7702810
VOLT. REFERENCE 4.7V	
LM103H-4.7	5962-7702811
VOLT. REFERENCE 5.0V	
AD586S	5962-8982401
AD586T	5962-8982402
VOLT. REFERENCE 5.1V	
LM103H-5.1	5962-7702812
VOLT. REFERENCE 5.6V	
LM103H-5.6	5962-7702813
VOLT. REFERENCE 5V PRECISION	
LT1029A	5962-9051901
LT1029	5962-9051902
VOLT. REFERENCE 6.9V PRECISION	
LM129A	5962-8992101
LM129A	/12402
LM129B	5962-8992102
LM129C	5962-8992103
LM129B	/12406
VOLT. REFERENCE 7.0V	
LT1021BM-7	5962-8864701
LT1021DM-7	5962-8864702
10217	/12408
VOLT. REFERENCE ADJUSTABLE OUTPUT +10V	
REF01A	5962-8958101
REF01	5962-8958102
VOLT. REFERENCE LOW-POWER PRECISION + 2.5V	
REF-43	5962-9060301
VOLT. REFERENCE PIN-PROGRAMMABLE	
AD588S	5962-8972801
AD588T	5962-8972802
VOLT. REFERENCE PRECISION	
LM199A	/12401
LM199A	5962-8856101
LM199	5962-8856102
LM199	/12404
VOLT. REFERENCE PRECISION 10V	
LT1031B	5962-8980201
LT1031C	5962-8980202
LT1031D	5962-8980203
VOLT. REFERENCE PRECISION 2.5V (.4%)	
1503A	5962-8686102
580U	5962-8686103

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MILITARY PARTS
SORTED BY FUNCTION

Industry P/N	Military* PN
VOLT. REFERENCE PRECISION 2.5V (1%)	
580S	5962-8686101
VOLT. REFERENCE PRECISION +10.000V	
2700	5962-8503001
2700U	5962-8503002
VOLT. REFERENCE PRECISION +10V ADJUSTABLE OUTPUT	
REF10A	5962-8947901
REF10B	5962-8947902
REF10A	/12403
VOLT. REFERENCE PRECISION +5V ADJUSTABLE OUTPUT	
REF02A	5962-8551401
VOLT. REFERENCE PRECISION -10.000V	
2701	5962-8503005
2701	5962-8503006
VOLT. REFERENCE PRECISION 10V	
(SEE DWG)	5962-8688201
LT1019A-10	5962-9059501
(SEE DWG)	5962-8688202
(SEE DWG)	5962-8688203
LT1019-10	5962-9059505
VOLT. REFERENCE PRECISION 2.5V	
LM136A-2.5	5962-8418001
LT1019A-2.5	5962-9059504
LT1019-2.5	5962-9059508
VOLT. REFERENCE PRECISION 4.5V	
LT1019A-4.5	5962-9059503
LT1019-4.5	5962-9059507
VOLT. REFERENCE PRECISION 5.0V	
LT1021BM-5	5962-8876201
LT1021CM-5	5962-8876202
LM136A-5.0	5962-8418002
LT1021DM-5	5962-8876203
10215	/12407
VOLT. REFERENCE PRECISION 5V	
LT1019A-5	5962-9059502
LT1019-5	5962-9059506
VOLT. REFERENCE PRECISION Ò10.000V	
2702S	5962-8503003
2702U	5962-8503004
VOLT. REFERENCE PROGRAMMABLE	
584S	/12801
AD584S	5962-3812801
584T	/12802
AD584T	5962-3812802

Sample and hold 20/

Industry P/N	Military* PN
AMPLIFIER 16-BIT TRACK AND HOLD	
SP9760	5962-9053001
SAMPLE AND HOLD AMPLIFIER	
2420	5962-8001601
198	5962-8760801
HA-5330	5962-8767701
198	/12501
5537	/12502
SAMPLE AND HOLD AMPLIFIER 16-BIT	
HS9716	5962-8956601
SAMPLE AND HOLD AMPLIFIER HIGH-SPEED	
AD585	5962-8754001
4860-83	/14201
HTC-0300A	5962-9073001
SAMPLE AND HOLD AMPLIFIER LOW-DROOP-RATE	
SMP-11A	5962-8954101
SMP-11B	5962-8954102
SMP-10A	5962-8954103
SMP-10B	5962-8954104

Hybrids /22

Industry P/N	Military* PN
DATA ACQUISITION SYSTEM 12-BIT	
HS9403-8	5962-8851401
HS9403-16	5962-8851402
DC/DC CONVERTER 15W Ò15V DUAL OUTPUT	
AHE2815D/CH	5962-9157501
AHE2815D/CH	5962-9157502
AHE2815D/CH	5962-9157503
DC/DC CONVERTER 20W 12V OUTPUT	
AHE2812S	5962-9158001
AHE2812S-SLV	5962-9158002
AHE2812S-MST	5962-9158003
DC/DC CONVERTER 30W Ò15V OUTPUT	
ATW2815D/CH	5962-9161301
ATW2815D/CHS	5962-9161302
ATW2815D/CHM	5962-9161303
DC/DC CONVERTER 5-VOLT SINGLE CHANNEL	
(SEE DWG)	5962-8968301
(SEE DWG)	5962-8968302
(SEE DWG)	5962-8968303
DR/D CONVERTER 1.0 V 400 HZ	
SDC14567-112	5962-9055102
SDC14567-114	5962-9055103
SDC14567-115	5962-9055104
DR/D CONVERTER 1.0 V 400 HZ TRIMMED VELOCITY	
SDC14569-111	5962-9055105
SDC14569-112	5962-9055106
SDC14569-114	5962-9055107
SDC14569-115	5962-9055108
DR/D CONVERTER 1.0V 400 HZ	
SDC14567-111	5962-9055101
OPTOCOUPLER 4-CHANNEL	
6N140A	5962-8302401
OPTOCOUPLER AC/DC TO LOGIC INTERFACE	
HCPL-5761	5962-8947701
OPTOCOUPLER DUAL	
66072	5962-8102801
4N55	5962-8767901
OPTOCOUPLER DUAL CHANNEL	
HCPL-5231	5962-8876901
OPTOCOUPLER DUAL CHANNEL LINE RECEIVER	
HCPL-1931	5962-8957201
OPTOCOUPLER DUAL CHANNEL WITH COMMON SUPPLY VOLTAGE AND GROUND CONNECTIONS	
66071-001	5962-8978501
66056	5962-8102802
HCPL-5531	5962-8767902
HCPL-5431	5962-8957101
OPTOCOUPLER DUAL CHANNEL WITH SEPARATE SUPPLY VOLT. AND GND. CONNECTIONS	
HCPL-6231	5962-8876902
OPTOCOUPLER DUAL CHANNEL WITH SEPARATE SUPPLY VOLTAGE AND GROUND CONNECTIONS	
HCPL-6731	5962-8978502
66125	5962-8767903
HCPL-6431	5962-8957102
66123	5962-8102803
OPTOCOUPLER SINGLE CHANNEL	
66079	5962-9167601
OPTOCOUPLER SINGLE CHANNEL HIGH-SPEED	
HCPL-5601	5962-9085501
OPTOCOUPLER SINGLE CHANNEL TRANSISTOR OUTPUT	
HCPL-5501	5962-9085401
OPTOCOUPLER SINGLE-CHANNEL	
HCPL-5201	5962-8876801
OPTOCOUPLER SINGLE-CHANNEL HIGH-GAIN	
66058	5962-8981001
OPTOCOUPLER SINGLE-CHANNEL HIGH-SPEED	
HCPL-5401	5962-8957001
REMOTE TERMINAL UNIT DUAL REDUNDANT	
BUS-65112	5962-8753501
2452	5962-8753502
RESOLVER TO DIGITAL CONVERTER 400 HZ	
HSDC-8920A	5962-8768701
HSDC-8920	5962-8768702
RESOLVER TO DIGITAL CONVERTER 400 HZ 6V INPUT	
RDC14505-641	5962-8768703
S-R/D CONVERTER 11.8V 400 HZ	
SDC14531-690	5962-9082001
SDC14531-631	5962-9082002
SYNCHRO-TO DIGITAL CONVERTER 60 HZ 90V	
SDC14502-605	5962-9070703
SYNCHRO-TO-DIGITAL CONVERTER 400 HZ 11.8V	
SDC14500-635	5962-9070701
SDC14500-636	5962-9070702
HSD1024-C672	5962-9070705
HSD1024-C673	5962-9070706
SYNCHRO-TO-DIGITAL CONVERTER 60 HZ 90V	
SDC14502-606	5962-9070704
HSD1024-C674	5962-9070707
HSD1024-C675	5962-9070708

Other digital devices /23

Industry P/N	Military* PN
BINARY CORRELATOR AND TEMPLATE MATCHER 1024-TAP 12 MHZ	
L64230-12	5962-9050401
BIT PROCESSOR DATA TERMINAL MIL-STD-1553	
CT1820	5962-9063601
BIT PROCESSOR MIL-STD-1553 DATA TERMINAL	
ARX2410	5962-9063603
ARX3410	5962-9063604
BIT PROCESSOR MIL-STD-1553 DATA TERMINAL WITH HIGH DATA BUS DRIVER CAPABILITY	
CT1820-2	5962-9063602
CONTACT BOUNCE ELIMINATOR HEX	
14490A	5962-8764601
DIGITAL SIGNAL PROCESSOR 16-BIT	
WEDSP-16	5962-9070401
FFT PROCESSOR 20 MHZ	
BFRP10	/63001
FILTER PHASE-LOCKED LOOP	
54HC297	5962-8999001
IMAGE RESAMPLING SEQUENCER 15 MHZ	
TMC2301	5962-8971501
IMAGE RESAMPLING SEQUENCER 18 MHZ	
TMC2301	5962-8971502
INTERRUPT GENERATOR	
68154	5962-8857201
INTERRUPT HANDLER	
68155	5962-8866601
OUTPUT CORRELATOR DIGITAL 64-BIT 25 MHZ	
L10C23	5962-8971101
OUTPUT CORRELATOR DIGITAL 64-BIT 30 MHZ	
TMC2023V1	5962-8971102
OUTPUT CORRELATOR DIGITAL 64-BIT 35 MHZ	

*Part numbers beginning with a slash "/" are MIL-M-38510 numbers. All others are DESC drawing numbers.

MILITARY PARTS
SORTED BY FUNCTION

Industry P/N	Military* PN
TMC2023V2	5962-8971103
OUTPUT CORRELATOR DIGITAL 64-BIT 50 MHZ	
TMC2023V3	5962-8971104
PHASE/FREQUENCY DETECTOR	
12540	5962-8775201
RATE GENERATOR PROGRAMMABLE BIT	
HD-4702	5962-9051801
REMOTE TERMINAL FOR STORES WITH 1K X 16 RAM	
UT1760ARTS	5962-8957501
REMOTE TERMINAL INTERFACE MIL-STD-1553B	
UT1553BRTIA	/55502
REMOTE TERMINAL INTERFACE WITH 1K X 16 RAM	
UT1553BRTR	5962-8957601
S/D CONVERTER 10-BIT 90V 60 HZ	
HSD1510-369	5962-9161501
VOLTAGE TRANSLATOR ECL-TO-TTL	
10H750	5962-9058801

Analog circuit functions 24/

Industry P/N	Military* PN
AMPLIFIER CURRENT FEEDBACK	
EL2030	5962-9081801
AMPLIFIER LOGARITHMIC WIDEBAND 120 MHZ	
SL523AC	5962-8980301
AMPLIFIER LOGARITHMIC WIDEBAND 140 MHZ	
SL521	5962-9079201
AMPLIFIER PROGRAMMABLE GAIN	
AD526	5962-9089401
AMPLIFIER VOLTAGE-CONTROLLED GAIN	
CLC520	5962-9169401
ANALOG I/O SYSTEM 8-BIT Ò LSB FOR DAC AND ADC	
AD7569S	5962-8962901
ANALOG I/O SYSTEM 8-BIT Ò1/2 LSB FOR DAC AND ADC	
AD7569T	5962-8962902
ANALOG MULTIPLIER 4-QUADRANT	
534T	/13901
534S	/13902
532S	/13903
4213	/13904
BALANCED MODULATOR/DEMODULATOR	
AD630	5962-8980701
BUFFER AMPLIFIER FET-INPUT CLOSED-LOOP Ò12V	
MSK332B-12	5962-9090201
BUFFER AMPLIFIER FET-INPUT CLOSED-LOOP Ò15V	
MSK332B-15	5962-9090202
BUFFER AMPLIFIER HIGH-SPEED VIDEO	
HA-5033	5962-8963301
BUFFER AMPLIFIER LOW POWER 70 MHZ	
EL2001A	5962-9153401
EL2001	5962-9153402
BUFFER FET	
EL2004	5962-8965901
BUFFER HIGH SPEED	
LM6125	5962-9081501
LM6121	5962-9081201
BUS INTERFACE CIRCUIT ARINC	
HS3282	5962-8688001
HI8282	5962-8688002
CONTROLLER SWITCHED-MODE FOR DC MOTOR DRIVE	
UC1637	5962-8995701
CURRENT BUFFER WIDEBAND HIGH OUTPUT	
HA-5002	5962-8963601
CURRENT FEEDBACK AMPLIFIER	
EL2020	5962-8962001
CURRENT MODE CONTROLLER CMOS	
TSC170	5962-8963801
TSC171	5962-8963802
DC TO DC CONVERTER CONTROL CIRCUIT	
35063	5962-9075701
DC-DC CONVERTER 12W 5V OUTPUT	
AHF2805S	5962-9160001
MHF+2805S	5962-9213901
DC-DC CONVERTER 15W 12V OUTPUT	
MHF+2812S	5962-9166401
DC-DC CONVERTER 15W Ò12V OUTPUT	
MHF+2812D	5962-9214401
DC-DC CONVERTER 15W Ò15V OUTPUT	
MHF+2815D	5962-9161401
DC/DC CONVERTER 15V SINGLE CHANNEL	
MHF+2815S	5962-9160101
DC/DC CONVERTER 15W +5V AND Ò15V TRIPLE OUTPUT	
ATO2815T/CH	5962-9095401
DC/DC CONVERTER 15W +5V Ò12V TRIPLE OUTPUT	
ATO2812T/CH	5962-9160201
DC/DC CONVERTER 15W Ò12V DUAL OUTPUT	
AHE2812D/CH	5962-9204001
AHE2812D/CHS	5962-9204002
AHE2812D/CHM	5962-9204003
DC/DC CONVERTER 20W 15V OUTPUT	
AHE2815S	5962-9162501
AHE2815S-SLV	5962-9162502
AHE2815S-MST	5962-9162503
DC/DC CONVERTER 30W 5V OUTPUT	
ATW2805S/CH	5962-9157901
ATW2805S/CHS	5962-9157902
ATW2805S/CHM	5962-9157903
DC/DC CONVERTER 30W Ò12V	
ATS2812D/CH	5962-9210901
ATW2812D/CHS	5962-9210902
ATW2812D/CHM	5962-9210903
DIGITAL-TO-SYNCHOR/DIGITAL-TO-RESOLVER CONVERTER 16-BIT	
DSC11520-115	5962-8998604
DIGITAL-TO-SYNCHRO/DIGITAL-TO-RESOLVER CONVERTER 16-BIT	
DSC11520-112	5962-8998601
DSC11520-113	5962-8998602
DSC11520-114	5962-8998603
DIODE ARRAY QUAD SCHOTTKY 1 AMP	
UC1611	5962-9053801
FEEDBACK GENERATOR ISOLATED	
UC1901	5962-8944101
FILTER 4TH-ORDER ELLIPTIC NOTCH	
LMF90	5962-9096801
FILTER 6TH-ORDER SWITCHED CAPACITOR BUTTERWORTH LOW-PASS	
LMF60-100	5962-9096701
LMF60-50	5962-9096702
FILTER CAUER LOW PASS LOW NOISE 8TH ORDER CLOCK SWEEPABLE	
LTC1064-4	5962-9064901
FILTER EMI 4.0A	
AFC-461	5962-9099001
FILTER UNIVERSAL DUAL	
LTC1060A	5962-8864101
FM IF SYSTEM HIGH PERFORMANCE LOW-POWER	
604A	5962-8956401
FREQUENCY CONTROLLER PHASE LOCKED	
UC1633	5962-9098701
INTERFACE CIRCUIT ANALOG	
TLC32040M	5962-9086301
INTERFACE CIRCUIT ANALOG VOICE-BAND	
TLC32044M	5962-9086302
LINE DRIVER VIDEO	
EL2003	5962-8962301
EL2033	5962-8962302
LOGARITHMIC AMPLIFIER DC COUPLED DEMODULATING 120 MHZ	
AD640	5962-9095501
MODULATOR/DEMODULATOR BALANCED	
1596	5962-8857101
MULTIPLIER/DIVIDER DUAL-CHANNEL WIDEBAND	
AD539	5962-8980901
OSCILLATOR VOLTAGE-CONTROLLED	
1648M	5962-8977801
OSCILLATOR VOLTAGE-CONTROLLED DUAL	
54LS629	5962-8102101
54LS124	5962-7704101
PHASE-LOCKED LOOP SYSTEM	
XR2211M	5962-7705001
PHASE-LOCKED LOOP WITH VOLTAGE-CONTROLLED OSCILLATOR	
54HCT4046A	5962-8875701
54HC4046A	5962-8960901
PHASE/FREQUENCY DETECTOR	
MC4344	5962-8780301
POWER SUPPLY OUTPUT SUPERVISORY CIRCUIT	
1543	5962-8774001
1544	5962-8774002
POWER SUPPLY SUPERVISORS DUAL	
TL7770-5M	5962-9093201
TL7770-12M	5962-9093202
TL7770-15M	5962-9093203
PULSE WIDTH MODULATOR CONTROLLER	
1823	5962-8990501
R/D CONVERTER 11.8 V 400 HZ 1.0 MINUTE ACCURACY	
SDC14565-115	5962-8990802
HRD1066-341V	5962-8990807
R/D CONVERTER 11.8 V 400 HZ 2.0 MINUTES ACCURACY	
SDC14565-114	5962-8990801
SDC14565-616	5962-8990803
HRD1066-341H	5962-8990806
R/D CONVERTER 11.8 V 400 HZ 80 HZ BANDWIDTH 2.0 MINUTES ACCURACY	
HRD1066-381H	5962-8990808
R/D CONVERTER 11.8 V 400 HZ TRIMMED VELOCITY 1.0 MINUTE ACCURACY P	
SDC14566-115	5962-8990804
R/D CONVERTER 7.0 V 400 HZ 80 HZ BANDWIDTH 2.0 MINUTES ACCURACY	
SDC14565-618	5962-8990805

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MILITARY PARTS SORTED BY FUNCTION

Industry P/N	Military* PN
RESOLVER-TO-DIGITAL CONVERTER 4 ARC MINUTE ACCURACY AND 10 TO 16 BITS RESOL.	
AD2S80A	5962-9096201
RMS-TO-DC CONVERTER WIDEBAND	
AD637	5962-8963701
S/D CONVERTER 14-BIT 11.8V 400 HZ	
SDC14610-112	5962-9205301
SDC14610T112	5962-9205302
SDC14611-112	5962-9205303
SDC14611T112	5962-9205304
SDC14615-112	5962-9205305
SDC14615T112	5962-9205306
SDC14616-112	5962-9205307
SDC14616T112	5962-9205308
SDC14615-114	5962-9205309
SDC14615T114	5962-9205310
SDC14616-114	5962-9205311
SDC14616T114	5962-9205312
SENSING CIRCUIT OVERVOLTAGE	
3523	5962-8978001
SIGNAL CONDITIONER LVDT	
5521	5962-9087901
SUPPLY AND LINE MONITOR QUAD	
UC1903	5962-8869701
SUPPLY VOLTAGE SUPERVISOR	
TL7705AM	5962-8868501
TL7702AM	5962-8868502
TL7705B	5962-8868503
TL7702B	5962-8868504
TL7705B	5962-8868505
SWITCHED CAPACITOR FILTER 8TH ORDER CLOCK SWEEPABLE ELLIPTIC (CAUER) LOWPASS	
LTC1064-1	5962-9069301
LTC1064-1A	5962-9069302
SYNCHRO-TO-DIGITAL CONVERTER 11.8V 400 HZ 1.0 MINUTE ACCURACY	
SDC14560-115	5962-8949902
HSD1066-341V	5962-8949905
SYNCHRO-TO-DIGITAL CONVERTER 11.8V 400 HZ 2.0 MINUTES ACCURACY	
SDC14560-114	5962-8949901
SDC14560-605	5962-8949903
HSD1066-381H	5962-8949906
SYNCHRO-TO-DIGITAL CONVERTER 90 V 400 HZ 1.0 MINUTES ACCURACY	
SDC14561-115	5962-8949802
SYNCHRO-TO-DIGITAL CONVERTER 90 V 400 HZ 2.0 MINUTES ACCURACY	
SDC14561-114	5962-8949801
SYNCHRO-TO-DIGITAL CONVERTER 90V 400 HZ 1.0 MINUTES ACCURACY	
HSD1066-349V	5962-8949804
SYNCHRO-TO-DIGITAL CONVERTER 90V 400 HZ 2.0 MINUTES ACCURACY	
HSD1066-349H	5962-8949803
SYNCHRO-TO-DIGITAL CONVERTER 90V 60 HZ 2.0 MINUTES ACCURACY	
SDC14562-114	5962-8949805
SYNCRHO-TO-DIGITAL CONVERTER 11.8V 400 HZ 2.0 MINUTES ACCURACY	
HSD1066-341H	5962-8949904
TEMPERATURE TRANSDUCER	
AD590J	5962-8757101
AD590K	5962-8757102
AD590L	5962-8757103
AD590M	5962-8757104
TONE DECODER/PHASE-LOCKED LOOP	
567	5962-8700301
TRANSISTOR ARRAY 7-GATE DARLINGTON	
2023	5962-8987601
TRANSISTOR ARRAY DARLINGTON EIGHT-GATE	
2821	5962-8968401
2823	5962-8968501
2824	5962-8968601
TRANSISTOR ARRAY HIGH-CURRENT NPN	
3183A	5962-8759801
SG3081	5962-8866401
TRANSISTOR ARRAY MATCHED PAIR	
LM194	5962-8777701
TRANSISTOR ARRAY POWER	
LM195	5962-8777801
TRANSISTOR ARRAY QUAD NPN	
EN2016	5962-8977601
EN2016A	5962-8977602
TRANSISTOR ARRAY QUAD PNP	
EN2015	5962-8977501
EN2015A	5962-8977502
UNIVERSAL FILTER BUILDING BLOCK QUAD	
LTC1064	5962-8948301
VOLT. DETECTOR PROGRAMMABLE	
ICL8211	5962-8984201
VOLT. FOLLOWER BUFFER INPUT 400 HZ	
HSDC-8915A	5962-9055401
HSDC-8915	5962-9055402
VOLT.-TO-FREQUENCY CONVERTER	
VFC32	/13801
LM131A	5962-8760701
VFC320	/13802
VOLTAGE CONVERTER SWITCHED CAPACITOR WITH REGULATOR	
LT1054M	5962-8956201
VOLTAGE DETECTOR PROGRAMMABLE	
MAX8211	5962-9081101
VOLTAGE DETECTOR PROGRAMMABLE HIGH OUTPUT CURRENT	
ICL8212	5962-8984202
MAX8212	5962-9081102
WAVEFORM GENERATOR/VOLTAGE-CONTROLLED OSCILLATOR PRECISION	
ICL8038	5962-8877201

Semicustom devices 25/

Industry P/N	Military* PN
GATE ARRAY SEMICUSTOM	
(SEE SPEC)	/60801
(SEE SPEC)	/60802
(SEE SPEC)	/60803
(SEE SPEC)	/60804
(SEE SPEC)	/60805
(SEE SPEC)	/60806
(SEE SPEC)	/60807
(SEE SPEC)	/60808
(SEE SPEC)	/60809
(SEE SPEC)	/60810
(SEE SPEC)	/60811
(SEE SPEC)	/60812
(SEE SPEC)	/60813
(SEE SPEC)	/60814
(SEE SPEC)	/60814SM
(SEE SPEC)	/60815
(SEE SPEC)	/60816
(SEE SPEC)	/60817
GATE ARRAY SEMICUSTOM (0 - 1000 GATES)	
(SEE SPEC)	/60501
GATE ARRAY SEMICUSTOM (0 - 1000 GATES)	
(SEE SPEC)	/60601
GATE ARRAY SEMICUSTOM (1001 - 2000 GATES)	
(SEE SPEC)	/60502
(SEE SPEC)	/60602
(SEE SPEC)	/60702
GATE ARRAY SEMICUSTOM (10001 - 11000 GATES)	
(SEE SPEC)	/60511
(SEE SPEC)	/60611
(SEE SPEC)	/60711
GATE ARRAY SEMICUSTOM (11001 - 12000 GATES)	
(SEE SPEC)	/60512
(SEE SPEC)	/60612
(SEE SPEC)	/60712
GATE ARRAY SEMICUSTOM (12001 - 15000 GATES)	
(SEE SPEC)	/60513
(SEE SPEC)	/60613
(SEE SPEC)	/60713
GATE ARRAY SEMICUSTOM (15001 - 25000 GATES)	
(SEE SPEC)	/60514
(SEE SPEC)	/60614
(SEE SPEC)	/60714
GATE ARRAY SEMICUSTOM (2001 - 3000 GATES)	
(SEE SPEC)	/60503
(SEE SPEC)	/60603
(SEE SPEC)	/60703
GATE ARRAY SEMICUSTOM (25001 - 35000 GATES)	
(SEE SPEC)	/60515
(SEE SPEC)	/60615
(SEE SPEC)	/60715
GATE ARRAY SEMICUSTOM (3001 - 4000 GATES)	
(SEE SPEC)	/60504
(SEE SPEC)	/60604
(SEE SPEC)	/60704
GATE ARRAY SEMICUSTOM (35001 - 45000 GATES)	
(SEE SPEC)	/60516
(SEE SPEC)	/60616
(SEE SPEC)	/60716
GATE ARRAY SEMICUSTOM (4001 - 5000 GATES)	
(SEE SPEC)	/60505
(SEE SPEC)	/60605
(SEE SPEC)	/60705
GATE ARRAY SEMICUSTOM (45001 - 55000 GATES)	
(SEE SPEC)	/60517
(SEE SPEC)	/60617
(SEE SPEC)	/60717
GATE ARRAY SEMICUSTOM (5001 - 6000 GATES)	
(SEE SPEC)	/60506
(SEE SPEC)	/60606
(SEE SPEC)	/60706
GATE ARRAY SEMICUSTOM (55001 - 65000 GATES)	
(SEE SPEC)	/60518
(SEE SPEC)	/60618
(SEE SPEC)	/60718
GATE ARRAY SEMICUSTOM (6001 - 7000 GATES)	
(SEE SPEC)	/60507
(SEE SPEC)	/60607
(SEE SPEC)	/60707
GATE ARRAY SEMICUSTOM (65001 - 75000 GATES)	
(SEE SPEC)	/60519
(SEE SPEC)	/60619
(SEE SPEC)	/60719
GATE ARRAY SEMICUSTOM (7001 - 8000 GATES)	
(SEE SPEC)	/60508
(SEE SPEC)	/60608
(SEE SPEC)	/60708
GATE ARRAY SEMICUSTOM (75001 - 85000 GATES)	
(SEE SPEC)	/60520
(SEE SPEC)	/60620
(SEE SPEC)	/60720
GATE ARRAY SEMICUSTOM (8001 - 9000 GATES)	
(SEE SPEC)	/60509
(SEE SPEC)	/60609
(SEE SPEC)	/60709
GATE ARRAY SEMICUSTOM (9001 - 10000 GATES)	
(SEE SPEC)	/60510
(SEE SPEC)	/60610
(SEE SPEC)	/60710
GATE ARRAY SEMICUSTROM (0 - 1000 GATES)	
(SEE SPEC)	/60701
GATE ARRAY 0 1000 GATES	
(SEE SPEC)	/60001

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Industry P/N	Military* PN
GATE ARRAY 0 3500 GATES	
(SEE SPEC)	/60002
GATE ARRAY 0 5000 GATES	
(SEE SPEC)	/60003
LINEAR ARRAY 12 MACRO-CELL LOCATIONS	
(SEE SPEC)	/70602
LINEAR ARRAY 16 MACRO-CELL LOCATIONS	
(SEE SPEC)	/70603
LINEAR ARRAY 4 MACROCELL LOCATIONS	
(SEE SPEC)	/70604
LINEAR ARRAY 8 MACROCELL LOCATIONS	
(SEE SPEC)	/70601
LINEAR ARRAY MULTICHIP	
MULITCHIP	/70605

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MILITARY PARTS
SORTED BY GENERIC INDUSTRY P/N

Industry P/N	Military* PN
0006	5962-8761701
0008	5962-8761702
0026	5962-7800802
0032	5962-8001301
0056	5962-7800801
061	/11901
061	5962-8102301
062	/11902
062	5962-8102302
064	/11903
064	5962-8102303
071	/11904
071	5962-8102304
072	/11905
072	5962-8102305
074	/11906
074	5962-8102306
100301	5962-9152801
100302	5962-9152802
100304	5962-9153701
100314	5962-9162901
100324	5962-9153001
100325	5962-9153101
100329	5962-9206601
100331	5962-9153601
100336	5962-9230601
100355	5962-9165401
100363	5962-9165501
100E416	5962-9309802
100E501	5962-9309902
100E504	5962-9310002
100E507	5962-9310102
100E511	5962-9232702
100E516	5962-9234302
100E551	5962-9310402
100H1042	5962-9207502
1010	5962-9096401
10180A	5962-9174801
10180B	5962-9174802
1020	/12705
1020	5962-9096501
1020-1	5962-9096502
102110	/12409
10215	/12407
10217	/12408
10501	/06001
10502	/06002
10504	/06201
10505	/06003
10506	/06004
10507	/06005
10509	/06006
10516	5962-7800901
10521	5962-8857701
10524	/06301
10525	/06302
10531	/06101
10535	/06104
10538	5962-9093501
10541	5962-8855701
10545	5962-8856001
10558	5962-8779201
10564	5962-8852701
10565	5962-9056101
1056A2	5962-92A0201
1056B2	5962-92A0301
1056C	5962-92A0401
1056D2	5962-92A0501
1056E	5962-92A0601
1056F	5962-92A0701
1056G	5962-92A0801
1056H2	5962-92A0901
1056J	5962-92A1001
1056K	5962-92A1101
1056L	5962-92A1201
1056S	5962-92A1401
1056T	5962-92A1301
1056W	5962-92A1501
10576	/06103
1057A3	5962-92A1701
1057C	5962-92A1801
1057D	5962-92A19O1
1057E	5962-92A2001
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2148H	/23806
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26F32	5962-7802005
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2824	5962-8968601

*Part numbers beginning with a slash "/" are MIL-M-38510 numbers. All others are DESC drawing numbers.

MILITARY PARTS
SORTED BY FUNCTION

Industry P/N	Military* PN
2864-250	/22808
2864-350	/22807
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4556B	5962-7704801
4557B	5962-7901601
4585B	5962-7703702
45H16	/24004
45H16	/24005
4741	/11003
48908	5962-9300701
49C410	5962-8864301
49C410A	5962-8864302
49C460A	5962-8853301
49C460B	5962-8853302
49C460C	5962-8853306
49C465A	5962-9212201
49FCT805	5962-9215701
49FCT805A	5962-9215702
49FCT806	5962-9215703
49FCT806A	5962-9215704
4C1024-150	/24904
4N55	5962-8767901
5040	/10501
5041	/10502
5042	/10503
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506	/19001
506A	/19002
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508A	/19005
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51C67	/29106
51C98-35	/61301
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51C98-55	/61303
5200	/12001
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5203	/12002
5204	/12004
5205	/12006
5206	/12007
5207	/12008
521	5962-8751601
5210	/12009
5211	/12011
5212	/12013
5212A	5962-9212901
5213	/12010
5214	/12012
5215	/12014
5216	/12015
5217	/12016
527	5962-8757201
529	5962-8757202
5305-1	/20401
5306-1	/20402
532S	/13903
5348-1	/20804
5349-1	/20805
534S	/13902
534T	/13901

*Part numbers beginning with a slash "/" are MIL-M-38510 numbers. All others are DESC drawing numbers.

MILITARY PARTS
SORTED BY GENERIC INDUSTRY P/N

Industry P/N	Military* PN	Industry P/N	Military* PN	Industry P/N	Military* PN	Industry P/N	Military* PN	Industry P/N	Military* PN
53S3281	/21102	5479	/00207	54AC253	5962-8769301	54ACT258	5962-8870401	54ALS165	5962-8957401
53S841	/20902	5480	/00604	54AC257	/76207	54ACT273	5962-8973501	54ALS168	/38103
5400	/00104	5482	/00601	54AC257	5962-8870301	54ACT299	5962-8877101	54ALS169B	/38003
5401	/00107	5483	/00602	54AC258	/76208	54ACT32	5962-8973601	54ALS169B	5962-8302501
5402	/00401	5485	/15001	54AC258	5962-9160401	54ACT323	5962-9160701	54ALS174	/37201
5403	/00109	5486	/00701	54AC273	/75601	54ACT373	5962-8755601	54ALS174	5962-8301901
5404	/00105	5490	/01307	54AC273	5962-8775601	54ACT374	5962-8763101	54ALS175	/37202
5405	/00108	5492	/01301	54AC280	5962-9220101	54ACT377	5962-8769701	54ALS175	5962-8301902
5406	/00801	5493	/01302	54AC299	/76506	54ACT399	5962-9093401	54ALS191	5962-8684001
5407	/00803	5495	/00901	54AC299	5962-8875401	54ACT520	5962-8979301	54ALS193	5962-8869801
5408	/01601	5496	/00902	54AC32	/75201	54ACT521	5962-8979302	54ALS20A	/37003
5409	/01602	54ABT16244	5962-9317401	54AC32	5962-8761401	54ACT534	5962-8965801	54ALS20A	5962-8858901
5410	/00103	54ABT16245	5962-9317501	54AC373	/75403	54ACT563	5962-8955601	54ALS21	5962-8414301
54107	/00203	54ABT244	5962-9214701	54AC373	5962-8755501	54ACT564	5962-8955701	54ALS240A	/38301
5412	/00106	54ABT543	5962-9231401	54AC374	/75602	54ACT573	5962-8766401	54ALS240A	5962-8859101
54121	/01201	54AC00	/75001	54AC374	5962-8769401	54ACT574	5962-8960101	54ALS241	/38302
54122	/01202	54AC00	5962-8754901	54AC377	/75603	54ACT74	5962-8752501	54ALS241	5962-8859601
54123	/01203	54AC02	/75101	54AC377	5962-8870201	54ACT818	5962-9160901	54ALS242B	/38506
54125	/15301	54AC02	5962-8761201	54AC378	5962-9160501	54ACT821	5962-8870501	54ALS242B	5962-8401301
54126	/15302	54AC04	/75701	54AC520	5962-9091601	54ACT823	5962-9161001	54ALS243A	/38507
5413	/15101	54AC04	5962-8760901	54AC521	5962-9098501	54ACT825	5962-9161101	54ALS243A	5962-8401302
54132	/15103	54AC05	5962-9059001	54AC533	/75404	54ACT899	5962-9314101	54ALS244A	/38303
5414	/15102	54AC08	/75203	54AC534	/75605	54ACTQ02	5962-9218101	54ALS244A	5962-8683901
54145	/01005	54AC08	5962-8761501	54AC540	/75710	54ACTQ10	5962-9218201	54ALS245A	5962-8403001
54147	/15601	54AC10	/75002	54AC540	5962-8769501	54ACTQ14	5962-9218301	54ALS251	5962-8413501
54148	/15602	54AC10	5962-8761001	54AC541	/75711	54ACTQ240	5962-9218401	54ALS253	5962-8509601
54150	/01401	54AC109	/75304	54AC541	5962-8870601	54ACTQ244	5962-9218601	54ALS257	5962-8509701
54151	/01406	54AC109	5962-8955101	54AC563	/75405	54ACTQ245	5962-9218701	54ALS258	5962-8862601
54153	/01403	54AC11	/75204	54AC564	/75606	54ACTQ373	5962-9218801	54ALS259	5962-8874101
54154	/15201	54AC11	5962-8761101	54AC573	/75406	54ACTQ377	5962-9219001	54ALS27	/37302
54155	/15202	54AC1100	/75021	54AC574	/75604	54ACTQ657	5962-9219701	54ALS27	5962-8683801
54156	/15203	54AC11000	5962-8754902	54AC623	/75505	54ACTQ841	5962-9220001	54ALS273	5962-8413601
54157	/01405	54AC11002	5962-8761202	54AC640	/75506	54ALS00A	/37001	54ALS29821	5962-9061601
5416	/00802	54AC11004	5962-8760902	54AC643	/75507	54ALS00A	5962-8683301	54ALS29823	5962-9067501
54160	/01303	54AC11008	5962-8761502	54AC646	/75508	54ALS02	/37301	54ALS29824	5962-9067502
54161	/01306	54AC11010	/75022	54AC646	5962-8968201	54ALS02	5962-8684401	54ALS29825	5962-9069501
54162	/01305	54AC11010	5962-8761002	54AC648	/75509	54ALS04B	/37006	54ALS29842	5962-9071001
54163A	/01304	54AC11011	5962-8761102	54AC74	/75302	54ALS04B	5962-8684301	54ALS29843	5962-9072001
54164	/00903	54AC11020	/75023	54AC74	5962-8852001	54ALS05A	5962-8854001	54ALS299	/37601
54165	/00904	54AC11020	5962-8761302	54AC821	5962-9160601	54ALS08	/37401	54ALS299	5962-8302101
5417	/00804	54AC11030	/75024	54AC86	/75202	54ALS08	5962-8684201	54ALS30A	/37004
54170	/01801	54AC11074	5962-8852002	54AC86	5962-8955001	54ALS09	5962-8414201	54ALS30A	5962-8683701
54174	/01701	54AC112	/75305	54ACQ244	5962-9217601	54ALS10	/37002	54ALS32	/37501
54175	/01702	54AC11240	5962-8755002	54ACT00	5962-8769901	54ALS1000A	5962-8405901	54ALS32	5962-8683601
54180	/01901	54AC11241	5962-8755102	54ACT04	5962-8973401	54ALS1002	/38402	54ALS323	/37602
54181	/01101	54AC11244	5962-8755202	54ACT08	5962-8954702	54ALS1003	/38403	54ALS323	5962-8302102
54182	/01102	54AC11373	5962-8755502	54ACT109	5962-8853401	54ALS1004	/38409	54ALS37	/38401
54185A	5962-7703001	54AC11520	5962-9091602	54ACT11000	5962-8769902	54ALS1004	5962-8406101	54ALS373	/37203
54192	/01308	54AC11521	5962-9098502	54ACT11004	5962-8973402	54ALS1005	/38410	54ALS373	5962-8302001
54193	/01309	54AC138	/75802	54ACT11008	5962-8954701	54ALS1008A	/38404	54ALS374	/37204
54194	/00905	54AC138	5962-8762201	54ACT11032	5962-8973602	54ALS1008A	5962-8409701	54ALS374	5962-8302002
54195	/00906	54AC139	/75803	54ACT11074	5962-8752502	54ALS1010A	/38405	54ALS38A	5962-8687101
5420	/00102	54AC139	5962-8762301	54ACT11109	5962-8853402	54ALS1010A	5962-8406001	54ALS520	5962-8869101
54221	5962-8771101	54AC14	/75702	54ACT11138	5962-8755402	54ALS1011	/38406	54ALS534	5962-8866801
5423	/00402	54AC14	5962-8762401	54ACT112	5962-8995001	54ALS1020	/38407	54ALS541	5962-8960201
5425	/00403	54AC151	/76201	54ACT11240	5962-8775902	54ALS1032	/38408	54ALS560	/38104
5426	/00805	54AC151	5962-8769101	54ACT11241	5962-8984702	54ALS1034	/38411	54ALS561A	/38004
5427	/00404	54AC153	/76202	54ACT11244	5962-8776002	54ALS1034	5962-8403101	54ALS561A	5962-8302203
5428	/16201	54AC153	5962-8762501	54ACT11245	5962-8766302	54ALS1035	/38412	54ALS563A	5962-8870001
5430	/00101	54AC157	/76203	54ACT11353	5962-9090601	54ALS1035	5962-8874201	54ALS564A	5962-8872801
5432	/16101	54AC157	5962-8953901	54ACT11373	5962-8755602	54ALS109A	/37102	54ALS568	/38105
54365	/16301	54AC158	/76204	54ACT11374	5962-8763102	54ALS109A	5962-8400001	54ALS569A	/38005
54366	/16302	54AC158	5962-8972901	54ACT11520	5962-8979303	54ALS10A	5962-8686501	54ALS569A	5962-8302502
54367	/16303	54AC161	/76302	54ACT11521	5962-8979304	54ALS11	/37402	54ALS573	/38201
54368	/16304	54AC161	5962-8956101	54ACT11534	5962-8965802	54ALS112A	/37103	54ALS573	5962-8401201
5437	/00302	54AC163	/76304	54ACT138	5962-8755401	54ALS112A	5962-8400002	54ALS574A	/37104
5438	/00303	54AC163	5962-8958201	54ACT139	5962-8755301	54ALS11A	5962-8684101	54ALS574A	5962-8400101
5440	/00301	54AC169	5962-9160301	54ACT151	5962-8875601	54ALS1244A	5962-8873801	54ALS576A	/37105
5442	/01001	54AC174	/75307	54ACT153	5962-8769801	54ALS1245A	5962-8873701	54ALS576A	5962-8400102
5443	/01002	54AC174	5962-8762601	54ACT157	5962-8968801	54ALS133	/37005	54ALS580	/38202
5444	/01003	54AC175	/75308	54ACT158	5962-8875501	54ALS133	5962-8859001	54ALS580	5962-8401202
5445	/01004	54AC175	5962-8955201	54ACT161	5962-9172201	54ALS137	5962-9066501	54ALS640A	/38501
5446	/01006	54AC191	/76305	54ACT16240	5962-9201801	54ALS138	/37701	54ALS640A	5962-8872701
5447	/01007	54AC191	5962-8974901	54ACT16244	5962-9202201	54ALS138	5962-8686601	54ALS641	/38502
5448	/01008	54AC20	/75003	54ACT16245	5962-9202301	54ALS139	5962-8768301	54ALS642	/38503
5449	/01009	54AC20	5962-8761301	54ACT163	5962-9172301	54ALS151	5962-8414101	54ALS643	/38504
5450	/00501	54AC240	/75703	54ACT16373	5962-9202401	54ALS153	5962-8413401	54ALS645A	/38505
5451	/00502	54AC240	5962-8755001	54ACT16374	5962-9202501	54ALS157	5962-8686901	54ALS645A	5962-8403301
5453	/00503	54AC241	/75704	54ACT174	5962-8775701	54ALS158	5962-8862501	54ALS646	5962-8995601
5454	/00504	54AC241	5962-8755101	54ACT175	5962-8969301	54ALS160	/38101	54ALS648	5962-9052301
5470	/00206	54AC244	/75705	54ACT240	5962-8775901	54ALS161B	/38001	54ALS652	5962-8867301
5472	/00201	54AC244	5962-8755201	54ACT241	5962-8984701	54ALS161B	5962-8302201	54ALS653	5962-8968701
5473	/00202	54AC245	/75503	54ACT244	5962-8776001	54ALS162	5962-8407901	54ALS688	5962-8857801
5474	/00205	54AC245	5962-8775801	54ACT245	5962-8766301	54ALS162A	/38102	54ALS74A	/37101
5475	/01501	54AC251	/76205	54ACT251	5962-8959901	54ALS163B	/38002	54ALS74A	5962-8401101
5476	/00204	54AC251	5962-8769201	54ACT253	5962-8776101	54ALS163B	5962-8302202	54ALS804	5962-8869301
5477	/01502	54AC253	/76206	54ACT257	5962-8968901	54ALS164	5962-8687001	54ALS805A	5962-8869401

*Part numbers beginning with a slash "/" are MIL-M-38510 numbers. All others are DESC drawing numbers.

MILITARY PARTS SORTED BY FUNCTION

Industry P/N	Military* PN
54ALS808	5962-8869501
54ALS832	5962-8414501
54ALS857	5962-8753301
54ALS857A	/37901
54ALS86	5962-8862101
54ALS870	5962-8988901
54ALS873	/38203
54ALS873	5962-8403201
54ALS874B	/37106
54ALS874B	5962-8401001
54ALS876	/37107
54ALS876	5962-8401002
54ALS880	/38204
54ALS880	5962-8403202
54ALS996	5962-8994501
54AS1000A	5962-9162701
54AS1004A	5962-8872901
54AS1032A	5962-8873001
54AS1034A	5962-8873101
54AS21	5962-8780401
54AS250A	5962-9056201
54AS286	5962-8966301
54AS640	5962-8955301
54AS646	5962-8759501
54AS651	5962-8875301
54AS652	5962-8868701
54AS756	5962-9056301
54AS760	5962-8776701
54AS804	5962-8776601
54AS805	5962-8779401
54AS808	5962-8852201
54AS821	5962-9078001
54AS822	5962-9078002
54AS823	5962-8952501
54AS825	5962-9078003
54AS826	5962-9078004
54AS832B	5962-8852301
54AS867	5962-8966801
54AS869	5962-8952601
54AS874	5962-9152901
54AS885	5962-8975701
54BCT125	5962-9093701
54BCT126	5962-9088901
54BCT2240	5962-9093901
54BCT2244	5962-9074101
54BCT240	5962-9074201
54BCT241	5962-9074301
54BCT244	5962-9062501
54BCT245	5962-9051401
54BCT2827A	5962-9074401
54BCT2828A	5962-9074501
54BCT373	5962-9074601
54BCT374	5962-9051601
54BCT534	5962-9074701
54BCT540	5962-9074801
54BCT541	5962-9074901
54BCT543	5962-9087001
54BCT544	5962-9155401
54BCT620A	5962-9075001
54BCT623	5962-9094001
54BCT640	5962-9075201
54BCT646	5962-9155501
54BCT652	5962-9155301
54BCT760	5962-9093801
54C08	5962-7703601
54C85	5962-7703701
54C906	5962-7705601
54C922	5962-8752101
54F00	/33001
54F02	/33301
54F04	/33002
54F074	/34101
54F08	/34001
54F09	5962-8872301
54F10	/33003
54F109	/34102
54F11	/34002
54F112	/34103
54F112	5962-9060602
54F113	5962-9060601
54F125	5962-9078101
54F132	5962-8948701
54F138	/33701
54F139	/33702
54F14	5962-8875201
54F148	5962-8607001
54F151A	/33901
54F153	/33902
54F157A	/33903
54F158A	/33904
54F160A	/34401
54F161A	/34301
54F162A	/34402
54F163A	/34302
54F164	5962-8607101
54F169	5962-8607201
54F174	/34107
54F175	/34104
54F181	/33801
54F181	5962-8671002
54F182	/33802
54F190	/34403
54F191	/34303
54F191	5962-9058201
54F192	/34404
54F193	/34304
54F194	/33601
54F194	5962-8685001
54F198	5962-9050201
54F20	/33004
54F21	5962-8955401
54F240	/33201
54F241	/33202
54F241	5962-8687401
54F242	/34801
54F243	/34802
54F243	5962-8683401
54F244	/33203
54F245	/34803
54F245	5962-8551101
54F251A	/33905
54F253	/33908
54F257A	/33906
54F258A	/33907
54F259	5962-8972301
54F269	5962-8862701
54F27	5962-8951001
54F273	5962-8855001
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54F283	/34201
54F299	5962-8957301
54F30	5962-8870801
54F30244	5962-8872201
54F30245	5962-8972201
54F3037	5962-9056501
54F32	/33501
54F322	5962-8607401
54F350	5962-8607501
54F352	/33909
54F353	/33910
54F36	5962-8870901
54F365	/35101
54F367	5962-8985701
54F37	/35201
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54F374	/34105
54F377	5962-9091001
54F378	/34108
54F378	5962-8855501
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54F38	/35202
54F38	5962-8687201
54F381	/33803
54F381	5962-8671001
54F382	/33804
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54F399	/35002
54F40	/35203
54F402	5962-9059301
54F432	5962-9058501
54F51	5962-8877401
54F518	5962-8871001
54F519	5962-8871101
54F520	5962-8871201
54F521	/34701
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54F534	/34106
54F540	/33204
54F541	5962-9175301
54F544	5962-8955501
54F545	/34804
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54F564	/34111
54F573	/34604
54F574	/34110
54F574	5962-8972401
54F579	5962-8954501
54F620	5962-8946601
54F621	5962-9050602
54F623	5962-9050601
54F64	/33401
54F646	5962-8975401
54F648	5962-8975402
54F652	5962-8955801
54F657	5962-8953501
54F676	5962-8854601
54F776	5962-8870701
54F777	5962-9159701
54F821	5962-8943801
54F827	5962-9209001
54F85	5962-8606901
54F86	/34501
54FCT138	5962-8765401
54FCT138A	5962-8765402
54FCT138AT	5962-9223303
54FCT138AT	5962-9223304
54FCT138CT	5962-9223305
54FCT138CT	5962-9223306
54FCT138T	5962-9223301
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54FCT139	5962-8950801
54FCT139A	5962-8950802
54FCT157AT	5962-9220803
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54FCT157CT	5962-9220806
54FCT157T	5962-9220801
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54FCT161A	5962-8864003
54FCT161AT	5962-9220903
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54FCT191	5962-8973303
54FCT191A	5962-8973302
54FCT191A	5962-8973304
54FCT193	5962-9066901
54FCT193A	5962-9066902
54FCT240	5962-8765501
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54FCT240AT	5962-9221303
54FCT240AT	5962-9221304
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54FCT241CT	5962-9223205
54FCT241CT	5962-9223206
54FCT241T	5962-9223201
54FCT241T	5962-9223202
54FCT244	5962-8763001
54FCT244A	5962-8763002
54FCT244AT	5962-9220302
54FCT244AT	5962-9220305
54FCT244CT	5962-9220303
54FCT244CT	5962-9220306
54FCT244T	5962-9220301
54FCT244T	5962-9220304
54FCT245	5962-8762901
54FCT245A	5962-8762902
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54FCT245T	5962-9221402
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54FCT540CT	5962-9222006
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54FCT573T	5962-9223804
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54FCT574C	5962-9222205
54FCT574C	5962-9222206
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54FCT645	5962-8865301
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54FCT645T	5962-9224401
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54FCT825AT	5962-9223001
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54FCT825B	5962-8867402
54FCT825BT	5962-9223003
54FCT825BT	5962-9223004
54FCT825CT	5962-9223005
54FCT825CT	5962-9223006

*Part numbers beginning with a slash "/" are MIL-M-38510 numbers. All others are DESC drawing numbers.

MILITARY PARTS
SORTED BY GENERIC INDUSTRY P/N

Industry P/N	Military* PN
54FCT827A	5962-8950601
54FCT827AT	5962-9224701
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54FCT827BT	5962-9224704
54FCT827CT	5962-9224705
54FCT827CT	5962-9224706
54FCT833A	5962-8973101
54FCT833B	5962-8973102
54FCT841A	5962-8857501
54FCT841B	5962-8857502
54FCT843A	5962-8975801
54FCT843B	5962-8975802
54FCT843C	5962-8975803
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54FCT861A	5962-8953301
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54FCT863A	5962-8866101
54FCT863B	5962-8866102
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54H103	/02206
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54H22	/02307
54H30	/02301
54H40	/02401
54H50	/04001
54H51	/04002
54H53	/04003
54H54	/04004
54H55	/04005
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54LS170	/31902
54LS170	5962-8002501
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54LS192	5962-7603601
54LS193	/31508
54LS193	5962-7600601
54LS194A	/30601
54LS195A	/30602
54LS196	/32001
54LS196	5962-7701001
54LS197	/32002

*Part numbers beginning with a slash "/" are MIL-M-38510 numbers. All others are DESC drawing numbers.

MILITARY PARTS
SORTED BY FUNCTION

Industry P/N	Military* PN	Industry P/N	Military* PN	Industry P/N	Military* PN	Industry P/N	Military* PN	Industry P/N	Military* PN
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54LS20	/30007	54LS592	5962-8762101	55109A	5962-8754702	57C43C-70	5962-9065801	68C901B-8	5962-9086403
54LS21	/31003	54LS595	5962-8671701	55110A	5962-8754701	57C64-70	5962-8510207	68HC000-10	5962-8946202
54LS22	/30008	54LS597	5962-8944401	55113	/10405	57L4013D	5962-8779111	68HC000-12	5962-8946203
54LS221	/31402	54LS598	5962-8975601	55113	5962-8874401	57L401D	5962-8779109	68HC000-8	5962-8946201
54LS221	5962-7604201	54LS628	5962-9204601	55114	5962-8874402	57L402D	5962-8779110	68HC001-10	5962-8946205
54LS240	/32401	54LS629	5962-8102101	55115	5962-8874501	580S	5962-8686101	68HC001-12	5962-8946206
54LS240	5962-7801201	54LS640	5962-8416101	55116	5962-8851101	580U	5962-8686103	68HC001-8	5962-8946204
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*Part numbers beginning with a slash "/" are MIL-M-38510 numbers. All others are DESC drawing numbers.

MILITARY PARTS
SORTED BY GENERIC INDUSTRY P/N

Industry P/N	Military* PN	Industry P/N	Military* PN	Industry P/N	Military* PN	Industry P/N	Military* PN	Industry P/N	Military* PN
7528	5962-8770101	7C132	5962-9062001	8088	5962-8768501	82S101	/50201	93422A	/23114
7528	5962-8770102	7C132	5962-9062002	80960MC-16	5962-9094601	82S105	5962-8670901	93425	/23102
7528	5962-8770103	7C132	5962-9062003	80960MC-20	5962-9094602	82S105	5962-8670902	93425	/23106
7537S	5962-8776301	7C136	5962-9062007	80960MC-25	5962-9094603	82S115	/20803	93425A	/23108
7537T	5962-8776302	7C136	5962-9062008	80960XA-16	5962-9094604	82S123A	/20704	93427	/20302
7537U	5962-8776303	7C136	5962-9062009	80960XA-20	5962-9094605	82S126A	/20303	93470	/23301
7541	/12704	7C142	5962-9062004	80960XA-25	5962-9094606	82S129A	/20304	93471	/23302
7545A	5962-8770206	7C142	5962-9062005	8097	5962-8506301	82S130A	/20403	936	/03003
7545B	5962-8770205	7C142	5962-9062006	8097BH	5962-8959601	82S131A	/20404	93CS66	5962-9154901
7545G	5962-8770204	7C146	5962-9062010	80C186-10	5962-8850101	82S137A	/20604	93L00	/02804
7545S	5962-8770201	7C146	5962-9062011	80C186-12	5962-8850102	82S153A	5962-8768201	93L01	/02907
7545S	5962-8770207	7C146	5962-9062012	80C186EB-13	5962-9310902	82S16	5962-8602301	93L08	/04502
7545T	5962-8770202	7C147	/28901	80C186EB-16	5962-9310903	82S185A	/20910	93L09	/04601
7545U	5962-8770203	7C148	/28902	80C186EB-8	5962-9310901	82S23A	/20703	93L10	/02504
7547S	5962-8965701	7C190	5962-8969401	80C187-10	5962-8944901	82S2708	/20905	93L12	/04602
7547T	5962-8965702	7C191	5962-9066401	80C187-12	5962-8944902	82S62	5962-8754301	93L14	/04501
7547U	5962-8965703	7C191	5962-9066402	80C196KB	5962-8998201	8397	5962-8552001	93L16	/02505
7549S	5962-8876501	7C191	5962-9066403	80C286-10	5962-9067801	8397BH	5962-8977201	93L18	/04301
7549T	5962-8876502	7C192	5962-8993501	80C286-12	5962-9067802	83C451	5962-8972602	93L22	/04603
7555	/14903	7C192	5962-8993502	80C287-10	5962-9065601	8572	5962-9164101	93L24	/04401
7555	5962-8950303	7C192	5962-8993503	80C31BH	5962-8506401	8744H-10	5962-8997101	93L28	/02803
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7556	5962-8950304	7C194	/29304	80C451	5962-8972601	8751H	5962-8419002	93L415	/23103
7575S	5962-8776201	7C194	/29311	80C51BH	5962-8506402	8751H-8	5962-8419001	93L420	/23004
7575T	5962-8776202	7C194	/29319	80C51BH-16	5962-8506404	8797BH	5962-8680901	93L422	/23112
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7603	/20702	7C194	/29331	80C86	5962-8405201	87C51	5962-8768401	93L425A	/23113
76165	/21005	7C194	/29332	80C86-2	5962-8405202	87C51-16	5962-8768402	93S16	5962-8672701
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7680	/20903	7C197	/29302	82188	5962-8767201	87C52	5962-9157601	93Z511	/21002
7681	/20904	7C197	/29310	8224	/42201	87C52	5962-9157603	93Z665-45	/21204
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78C30	5962-8988201	80286-10	5962-8514803	82C237	5962-9054304	9300	/15901	96F172	5962-9076501
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7912A	5962-8874701	8035AHL	5962-8856801	82C37A-12	5962-9054303	9317	/15802	AD1385TD/883	5962-9171201
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7969-125V	5962-9052801	80386-20	5962-8766803	82C54-12	5962-8406502	9324	/15002	AD346	5962-8994001
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7B164	5962-9159302	80486DX-33	5962-9310502	82C84A	5962-8406801	93412	/23109	AD524	5962-8853901
7B164	5962-9159303	8048AH	5962-8856802	82C84A	5962-8406802	93415	/23101	AD524S	/14301
7B166	5962-9159304	8080A	/42001	82C86H-5	5962-8757701	93415	/23105	AD526	5962-9089401
7B166	5962-9159305	8080A	5962-7700201	82C87H-5	5962-8757702	93415	/23107	AD539	5962-8980901
7B166	5962-9159306	8085A	5962-7901001	82C88	5962-8406901	93417	/20301	AD558S	5962-8778901
7C123	5962-9069601	8086	/53001	82C89	5962-8552801	93419	/23201	AD558T	/14401
7C123	5962-9069602	8087	5962-8854702	82HS321A	/21101	93421	/23002	AD558T	5962-8778902
7C123	5962-9069603	8087-2	5962-8854701	82S100	/50202	93422	/23110	AD567S	5962-8780101

*Part numbers beginning with a slash "/" are MIL-M-38510 numbers. All others are DESC drawing numbers.

MILITARY

MILITARY PARTS
SORTED BY FUNCTION

Industry P/N	Military* PN	Industry P/N	Military* PN	Industry P/N	Military* PN	Industry P/N	Military* PN	Industry P/N	Military* PN
AD568SE	5962-8980802	AD96687	5962-7801903	ARX3464	5962-8959206	C22V10	5962-8867003	DAC8221A	5962-8967101
AD568SQ	5962-8980801	AD9696	5962-9234701	ARX3467	5962-8959205	C22V10	5962-8867004	DAC8222A	5962-8967201
AD570	5962-8680201	AD9698	5962-9234702	ATO2812T/CH	5962-9160201	C22V10	5962-8867005	DAC8412A	5962-9176401
AD571	/13401	ADC-908A	5962-8961601	ATO2815T/CH	5962-9095401	C22V10-15	/50804	DAC8412B	5962-9176402
AD571	5962-8680202	ADC-908B	5962-8961602	ATR2812TF/CH	5962-9315801	C22V10-20	/50803	DAC8413A	5962-9176403
AD573S	5962-8850501	ADC-HX	5962-8850801	ATR2815TF/CH	5962-9215901	C22V10-25	/50802	DAC8413B	5962-9176404
AD578SD	5962-8865801	ADC-HZ	5962-8850802	ATS2812D/CH	5962-9210901	C22V10-30	/50801	DAC87	/13701
AD578TD	5962-8865802	ADC00300	5962-8854201	ATW2805S/CH	5962-9157901	C22V10L	5962-8872404	DAC87	/13702
AD578ZSD	5962-8865803	ADC0802	5962-9096601	ATW2805S/CHM	5962-9157903	C22V10L	5962-8975501	DAC87	/13703
AD578ZTD	5962-8865804	ADC1241	5962-9157801	ATW2805S/CHS	5962-9157902	C22V10L	5962-8975502	DAC87	5962-8300201
AD584S	5962-3812801	ADC12441	5962-9157802	ATW2812D/CHM	5962-9210903	C22V10L	5962-8975503	DAC87	5962-8300301
AD584T	5962-3812802	ADG201HST	5962-8671603	ATW2812D/CHS	5962-9210902	C22V10L	5962-8975504	DG129A	5962-7801401
AD585	5962-8754001	ADG526A	5962-8971001	ATW2815D/CH	5962-9161301	C22V10L-25	5962-8872401	DG180A	5962-8767301
AD586S	5962-8982401	ADG527A	5962-8971002	ATW2815D/CHM	5962-9161303	C22V10L-30	5962-8872402	DG181A	/11101
AD586T	5962-8982402	ADG528A	5962-9063501	ATW2815D/CHS	5962-9161302	C22V10L-40	5962-8872403	DG182A	/11102
AD587SQ	5962-8982501	ADG529A	5962-9063502	BFRP10	/63001	C57401	5962-8779105	DG184A	/11103
AD587TQ	5962-8982502	ADH-030	5962-9063401	BT102	5962-8965301	C57401A	5962-8779107	DG185A	/11104
AD587UQ	5962-8982503	AH5010	5962-9087801	BT458	5962-8992801	C57402	5962-8779106	DG187A	/11105
AD588S	5962-8972801	AH5012	5962-9088001	BU-61580X1	5962-9306503	C57402A	5962-8779108	DG188A	/11106
AD588T	5962-8972802	AHE2812D/CH	5962-9204001	BU-61580X2	5962-9306504	CA3130BT	5962-7703301	DG189	5962-9068901
AD590J	5962-8757101	AHE2812D/CHM	5962-9204003	BU-61581X1	5962-9306507	CLC110	5962-8997501	DG190A	/11107
AD590K	5962-8757102	AHE2812D/CHS	5962-9204002	BU-61581X2	5962-9306508	CLC114	5962-9233901	DG191A	/11108
AD590L	5962-8757103	AHE2812S	5962-9158001	BU-65170X1	5962-9306501	CLC200A	5962-8991001	DG271	5962-8671602
AD590M	5962-8757104	AHE2812S-MST	5962-9158003	BU-65170X2	5962-9306502	CLC201A	5962-9083301	DG401	5962-9056901
AD598	5962-9067101	AHE2812S-SLV	5962-9158002	BU-65171X1	5962-9306505	CLC205A	5962-9083501	DG403	5962-8976301
AD625	5962-8771901	AHE2815D/CH	5962-9157501	BU-65171X2	5962-9306506	CLC206A	5962-8985801	DG405	5962-8996101
AD630	5962-8980701	AHE2815D/CH	5962-9157502	BUS-63105	5962-8604901	CLC207A	5962-9097701	DG408	5962-9204201
AD637	5962-8963701	AHE2815D/CH	5962-9157503	BUS-63105II	5962-8604902	CLC220A	5962-8991101	DG409	5962-9204202
AD640	5962-9095501	AHE2815S	5962-9162501	BUS-63125	5962-8757901	CLC221A	5962-9083601	DG411	5962-9073101
AD650	/13803	AHE2815S-MST	5962-9162503	BUS-63125II	5962-8757902	CLC231A	5962-8959401	DG412	5962-9073102
AD664TD-BIP	5962-8871902	AHE2815S-SLV	5962-9162502	BUS-63127II	5962-8982601	CLC232A	5962-9166501	DG413	5962-9073103
AD664TD-UNI	5962-8871901	AHF2805S	5962-9160001	BUS-63147	5962-8952201	CLC401	5962-8997301	DG417A	5962-9073701
AD664TE	5962-8871903	AHF2812D/CH	5962-9211101	BUS-63148	5962-8952204	CLC402	5962-9203301	DG418A	5962-9073702
AD667S	5962-8865901	AHF2815D/CH	5962-9235101	BUS-65111	5962-8763201	CLC404	5962-9099401	DG419A	5962-9073703
AD673S	5962-8850502	AHV2805SF/CH	5962-9177301	BUS-65112	5962-8753501	CLC406	5962-9200401	DG441A	5962-9204101
AD684	5962-9201301	AHV2812TF/CH	5962-9211501	BUS-65142	5962-8979801	CLC409	5962-9203401	DG442A	5962-9204102
AD688	5962-9321401	AHV2815TF/CH	5962-9211601	BUS-65143	5962-8979802	CLC410	5962-9060001	DG5140	5962-8100609
AD713S	5962-9063301	AM27C020-150	5962-9091203	BUS-65153	5962-9216201	CLC414	5962-9169301	DG5141	5962-8100610
AD713T	5962-9063302	AM27C020-200	5962-9091202	BUS-65154	5962-9216202	CLC415	5962-9305501	DG5144	5962-8100613
AD7541AS	5962-8948101	AM27C020-250	5962-9091201	BUS-65600	5962-8858501	CLC420A	5962-9175801	DG5145	5962-8100606
AD7541AT	5962-8948102	AM2901	5962-7700702	BUS-66300II	5962-8858601	CLC420B	5962-9175802	DG528	5962-8768901
AD7569S	5962-8962901	AM2932	5962-8605001	BUS-8553	5962-8604905	CLC430	5962-9203001	DG542	5962-9155201
AD7569T	5962-8962902	AM29833A	5962-9051301	BUS63102II	5962-9174903	CLC500	5962-9092501	DS1631	5962-8863101
AD7572	5962-8759101	AM29853A	5962-9051302	BUS63104II	5962-9174904	CLC501	5962-8997401	DS1632	5962-9052201
AD7572	5962-8759102	AM29855A	5962-9051303	BUS63135II	5962-8944704	CLC502	5962-9174301	DS1634	5962-8982101
AD7572	5962-8759103	AM29C818	5962-9051501	BX1750A	5962-8951901	CLC505	5962-9099301	DS16F95	5962-8961501
AD7572	5962-8759104	AM29C821A	5962-8851605	BX1750A	5962-8951902	CLC520	5962-9169401	DS1776	5962-9231701
AD7572	5962-8759105	AM29C823A	5962-8851606	BX1750A	5962-8951903	CLC925B	5962-9099501	DSC11520-112	5962-8998601
AD7572	5962-8759106	AM6687	5962-7801902	BX1750A	5962-8951991	CMM5104	/24505	DSC11520-113	5962-8998602
AD7579	5962-8969801	AM686	5962-7801801	BX1750A	5962-8951992	CMM5114	/24506	DSC11520-114	5962-8998603
AD7580	5962-8969802	AM687	5962-7801901	BX1750A	5962-8951993	CMP-01	5962-8987101	DSC11520-115	5962-8998604
AD767	5962-8961701	AM85C30-10	5962-8868903	C16L8-20	5962-8867809	CMP04B	5962-8990403	EF4442	5962-9071901
AD7672TQ05	5962-8965503	AM85C30-12	5962-8868904	C16L8-20	5962-8871309	CMP404A	5962-8990401	EL-2039	5962-8778702
AD7672TQ10	5962-8965501	AM85C30-16	5962-8868905	C16L8-30	5962-8867805	CMP404B	5962-8990402	EL-2040	5962-8964802
AD7672UQ05	5962-8965504	AM85C30-8	5962-8868906	C16L8-30	5962-8871305	CS5012	5962-8967901	EL-2041	5962-8778502
AD7672UQ10	5962-8965502	AM9130AFC	/23702	C16L8-40	5962-8867801	CS5014-S	5962-8967401	EL-2190	5962-8778402
AD7820T	5962-8865002	AM9130AFM	/23704	C16L8-40	5962-8871301	CS5014-T	5962-8967402	EL2001	5962-9153402
AD7820U	5962-8865001	AM9130CFC	/23701	C16R4-20	5962-8867812	CS5016-S	5962-8967601	EL2001A	5962-9153401
AD7821	5962-8951801	AM9130CFM	/23703	C16R4-20	5962-8871312	CS5016-T	5962-8967602	EL2002	5962-9050902
AD7846	5962-8969701	AM9140AFC	/23710	C16R4-30	5962-8867808	CS5101A-SD	5962-9169101	EL2002A	5962-9050901
AD7874	5962-9152101	AM9140AFM	/23712	C16R4-30	5962-8871308	CS5101A-TD	5962-9169102	EL2003	5962-8962301
AD790	5962-9150501	AM9140CFC	/23709	C16R4-40	5962-8867804	CS5102A-S	5962-9169201	EL2004	5962-8965901
AD811	5962-9313101	AM9140CFM	/23711	C16R4-40	5962-8871304	CS5102A-T	5962-9169202	EL2018	5962-9175501
AD827	5962-9211701	AM91L30AF	/23706	C16R6-20	5962-8867811	CS5412-SC1	5962-9095702	EL2019	5962-9212801
AD829	5962-9312901	AM91L30AFM	/23708	C16R6-20	5962-8871311	CS5412-TC1	5962-9095701	EL2020	5962-8962001
AD830	5962-9313001	AM91L30CF	/23705	C16R6-30	5962-8867807	CT1487D	5962-8757907	EL2030	5962-9081801
AD840	5962-8964001	AM91L30CFM	/23707	C16R6-30	5962-8871307	CT1589D	5962-8982606	EL2033	5962-8962302
AD841	5962-8964101	AM91L40AFC	/23714	C16R6-40	5962-8867803	CT1589M	5962-9082907	EL2038	5962-9153501
AD842	5962-8964201	AM91L40AFM	/23716	C16R6-40	5962-8871303	CT1589MI	5962-9082908	EL2072	5962-8997502
AD843	5962-9098001	AM91L40CFC	/23713	C16R8-20	5962-8867810	CT1820	5962-9063601	EL2171	5962-8997302
AD844	5962-8964401	AM91L40CFM	/23715	C16R8-20	5962-8871310	CT1820-2	5962-9063602	EL2232	5962-9167501
AD845	5962-8964501	AMP-01A	5962-8863001	C16R8-30	5962-8867806	CT2521	5962-8952205	EN2015	5962-8977501
AD846	5962-8964601	AMP-01B	5962-8863002	C16R8-30	5962-8871306	CY7C331-25	5962-8985503	EN2015A	5962-8977502
AD847S	5962-8964701	AP1	5962-9210401	C16R8-40	5962-8867802	CY7C331-30	5962-8985502	EN2016	5962-8977601
AD872	5962-9306001	AP2	5962-9210601	C16R8-40	5962-8871302	CY7C331-40	5962-8985501	EN2016A	5962-8977602
AD9002S	5962-9050801	ARX-4418	5962-9208503	C22V10	/50701	DAC-08	/11301	F9450-15	5962-8416901
AD9002T	5962-9050802	ARX-4451	5962-9208502	C22V10	/50702	DAC-08A	/11302	F9450-F15	5962-8416904
AD9005A	5962-9066601	ARX2402	5962-8604903	C22V10	/50703	DAC-8408A	5962-8967801	F9450-F18	5962-8416902
AD9012S	5962-8965401	ARX2410	5962-9063603	C22V10	/50704	DAC-8408B	5962-8967802	F9450-F20	5962-8416903
AD9012T	5962-8965402	ARX2411	5962-8757903	C22V10	5962-8753901	DAC-HKB	5962-8952801	FC155361	5962-8604907
AD9048S	5962-9092702	ARX3402	5962-8604904	C22V10	5962-8753902	DAC-HKB-2	5962-8952802	FC1553621	5962-8757909
AD9048T	5962-9092701	ARX3410	5962-9063604	C22V10	5962-8753903	DAC-HPB	5962-8953101	FC1553622	5962-8944703
AD9300	5962-9201401	ARX3411	5962-8757904	C22V10	5962-8753904	DAC-HPB-1	5962-8953102	FC1553623	5962-8757906
AD9617S	5962-9086801	ARX3416	5962-8944701	C22V10	5962-8753905	DAC02310-112	5962-8851701	FC155371	5962-9082901
AD9617T	5962-9086802	ARX3419	5962-8982602	C22V10	5962-8753906	DAC02310-113	5962-8851702	FC155372	5962-9082902
AD9618S	5962-9086803	ARX3420	5962-9082903	C22V10	5962-8867001	DAC08	5962-8993201	FC1553721	5962-8982605
AD9618T	5962-9086804	ARX3424	5962-9082904	C22V10	5962-8867002	DAC703	5962-8856301	FC155391	5962-8979901

*Part numbers beginning with a slash "/" are MIL-M-38510 numbers. All others are DESC drawing numbers.

MILITARY PARTS
SORTED BY GENERIC INDUSTRY P/N

Industry P/N	Military* PN
FC155392	5962-8979902
FC1553921	5962-8952206
FC1553923	5962-8952207
FLP	5962-9210301
FXP	5962-9202601
HA-2400	5962-8778301
HA-2520	5962-8988002
HA-2522	5962-8988001
HA-2529	5962-8972101
HA-2539	5962-8778701
HA-2540	5962-8964801
HA-2541	5962-8778501
HA-2542	5962-8964301
HA-2544	5962-8950201
HA-2546	5962-9325101
HA-4902	5962-8686001
HA-5002	5962-8963601
HA-5033	5962-8963301
HA-5101	5962-8963501
HA-5102	5962-8954801
HA-5104	5962-8850201
HA-5111	5962-8963101
HA-5112	5962-8963201
HA-5114	5962-8963401
HA-5127	5962-8962701
HA-5137	5962-8962702
HA-5141	5962-8965601
HA-5142	5962-8965602
HA-5144	5962-8965603
HA-5147	5962-8962703
HA-5190	5962-8778401
HA-5221	5962-9163401
HA-5222	5962-9163402
HA-5330	5962-8767701
HA-5340	5962-9306301
HA2444	5962-9309501
HCP16003	5962-9054401
HCPL-1931	5962-8957201
HCPL-5201	5962-8876801
HCPL-5231	5962-8876901
HCPL-5401	5962-8957001
HCPL-5431	5962-8957101
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HCPL-5761	5962-8947701
HCPL-6231	5962-8876902
HCPL-6431	5962-8957102
HCPL-6531	5962-8767903
HCPL-6631	5962-8102803
HCPL-6731	5962-8978502
HD-4702	5962-9051801
HD-6402B	5962-9052502
HD-6402R	5962-9052501
HD1-15531	5962-9054901
HD1-15531B	5962-9054902
HDAS-16	5962-8851404
HDAS-8	5962-8851403
HDSR2056P34H	5962-9155903
HDSR2056P34S	5962-9155904
HDSR2056P34V	5962-9155901
HDSR2056P34V	5962-9155902
HI-516	5962-8869901
HI-8382	5962-8687901
HI201HS	5962-8671601
HI5040	5962-8100601
HI5042	5962-8100611
HI5043	5962-8100612
HI5045	5962-8100614
HI5046	5962-8100615
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HI5047	5962-8100616
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HI509	5962-8513109
HI524	5962-8761801
HI546	5962-8513101
HI547	5962-8513102
HI549	5962-8513103
HI8282	5962-8688002
HOS-050A	5962-8857901
HOS-060SH	5962-8857902
HPC16083	5962-9054402
HPROM-512	/20101
HRD1066-341H	5962-8990806
HRD1066-341V	5962-8990807
HRD1066-381H	5962-8990808
HS-1840RH	5962-8753801
HS1068	5962-8877601
HS3282	5962-8688001
HS362	5962-8956501
HS9324	5962-8862901
HS9378SB	5962-8986202
HS9378TB	5962-8986201
HS9403-16	5962-8851402
HS9403-8	5962-8851401
HS9576S	5962-9079501
HS9576T	5962-9079502
HS9716	5962-8956601
HSD1024-C672	5962-9070705
HSD1024-C673	5962-9070706
HSD1024-C674	5962-9070707
HSD1024-C675	5962-9070708
HSD1046341H2	5962-9156002
HSD1046341S2	5962-9156003
HSD1046341V2	5962-9156001
HSD1066-341H	5962-8949904
HSD1066-341V	5962-8949905
HSD1066-349H	5962-8949803
HSD1066-349V	5962-8949804
HSD1066-381H	5962-8949906
HSD1510-369	5962-9161501
HSDC-8915	5962-9055402
HSDC-8915A	5962-9055401
HSDC-8920	5962-8768702
HSDC-8920A	5962-8768701
HSRD1006-341	5962-9213801
HSRD1006-341	5962-9213802
HSRD1006-341	5962-9213803
HSRD1006-341	5962-9213804
HSSR-7111	5962-9314001
HTC-0300	/14201
ICL7667	5962-8766001
ICL8038	5962-8877201
ICL8211	5962-8984201
ICL8212	5962-8984202
ICM7170	5962-8765301
IDT75C48S20	5962-8874301
IDT75C48SC30	5962-8874302
IH5041	5962-8100602
IH5042	5962-8100603
IH5043	5962-8100604
IH5044	5962-8100605
IH5046	/10507
IH5046	5962-8100607
IH5047	/10508
IH5047	5962-8100608
IH5116	5962-8513104
IH5208	5962-8513106
IH5216	5962-8513105
IH5352	5962-8875001
IM5603A	/20201
IM5623	/20202
INA101	5962-8778001
INA101	5962-8778002
L293D	5962-9235001
L29C520	5962-9176201
L29C520	5962-9176202
L29C520	5962-9176203
L29C521	5962-9176204
L29C521	5962-9176205
L29C521	5962-9176206
L4C381-45	5962-8995901
L5380	5962-9054801
L53C80	5962-9054802
L64230-12	5962-9050401
L64230-16	5962-9050402
LF155	/11401
LF155A	/11404
LF156	/11402
LF156A	/11405
LF157	/11403
LF157A	/11406
LH0002	5962-7801301
LH0021	5962-8508801
LH0033	5962-8001401
LH0041	5962-8508701
LH0101	5962-8508902
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M41256P-15	/24602
M80186-6	5962-8501002
M80186-8	5962-8501001

*Part numbers beginning with a slash "/" are MIL-M-38510 numbers. All others are DESC drawing numbers.

MILITARY PARTS
SORTED BY FUNCTION

Industry P/N	Military* PN
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PAL22V10	5962-8605302
PAL22V10-12	5962-8605305
PAL22V10-20	5962-8605304
PAL22V10A	5962-8605301
PAL22VP10-25	5962-8605303
PLS161	5962-8850401
PLS168	5962-9201201
PLS173	5962-8850402
PLS179	5962-8850701
PLUS20L8	5962-8767105
PLUS20R8	5962-8767106
PM-7574A	5962-8961603
PM-7574B	5962-8961604
PM7541AA	5962-8948104
PM7541AB	5962-8948103
R675B-3	/13602
R675B-4	/13601
RDC14505-641	5962-8768703
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REF01	5962-8958102
REF01A	5962-8958101
REF02	5962-8551402
REF02A	5962-8551401
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REF10B	5962-8947902
RGBDAC3808H	5962-8950901
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SDC14500-636	5962-9070702
SDC14502-605	5962-9070703
SDC14502-606	5962-9070704
SDC14531-631	5962-9082002
SDC14531-690	5962-9082001
SDC14560-114	5962-8949901
SDC14560-115	5962-8949902
SDC14560-605	5962-8949903
SDC14561-114	5962-8949801
SDC14561-115	5962-8949802
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SDC14565-115	5962-8990802
SDC14565-616	5962-8990803
SDC14565-618	5962-8990805
SDC14566-115	5962-8990804
SDC14567-111	5962-9055101
SDC14567-112	5962-9055102
SDC14567-114	5962-9055103
SDC14567-115	5962-9055104
SDC14569-111	5962-9055105
SDC14569-112	5962-9055106
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SDC14570-112	5962-9204801
SDC14571-112	5962-9204802
SDC14572-112	5962-9204901
SDC14573-112	5962-9205001
SDC14574-112	5962-9204902
SDC14575-112	5962-9204803
SDC14575-114	5962-9204805
SDC14576-112	5962-9204804

*Part numbers beginning with a slash "/" are MIL-M-38510 numbers. All others are DESC drawing numbers.

MILITARY PARTS SORTED BY GENERIC INDUSTRY P/N

Industry P/N	Military* PN
SDC14576-114	5962-9204806
SDC14577-112	5962-9204903
SDC14577-114	5962-9204905
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SDC14578-114	5962-9205003
SDC14579-112	5962-9204904
SDC14579-114	5962-9204906
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SDC14600T112	5962-9173602
SDC14601-112	5962-9173603
SDC14601T112	5962-9173604
SDC14602-112	5962-9205101
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SDC14603-112	5962-9205201
SDC14603T112	5962-9205202
SDC14604-112	5962-9205103
SDC14605-112	5962-9173605
SDC14605-114	5962-9173609
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SDC14605T114	5962-9173610
SDC14606-112	5962-9173607
SDC14606-114	5962-9173611
SDC14606T112	5962-9173608
SDC14606T114	5962-9173612
SDC14607-112	5962-9205105
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SDC14607T112	5962-9205106
SDC14607T114	5962-9205110
SDC14608-112	5962-9205203
SDC14608-114	5962-9205205
SDC14608T112	5962-9205204
SDC14608T114	5962-9205206
SDC14609-112	5962-9205107
SDC14609-114	5962-9205111
SDC14609T112	5962-9205108
SDC14609T114	5962-9205112
SDC14610-112	5962-9205301
SDC14610T112	5962-9205302
SDC14611-112	5962-9205303
SDC14611T112	5962-9205304
SDC14612-112	5962-9205401
SDC14612T112	5962-9205402
SDC14613-112	5962-9205501
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SG3081	5962-8866401
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SP8718	5962-8861701
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SP8755	5962-8868401
SP9588	5962-9063101
SP9760	5962-9063001
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TDC1010C1V	/50003
TDC1012	5962-9059601
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TDC1044	5962-8982801
TDC1046	5962-8778601
TDC1048	5962-8760001
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TL7705AM	5962-8868501
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TL7705B	5962-8868505
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TL7770-15M	5962-9093203
TL7770-5M	5962-9093201
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TLC2274	5962-9318201
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TLC2652M	5962-9089501
TLC2654M	5962-9089502
TLC272	5962-8949401
TLC274	5962-9060401
TLC277	5962-8949402
TLC279	5962-9060402
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TLC27L7	5962-8949404
TLC27L9	5962-9060406
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TLC27M4	5962-9060403
TLC27M7	5962-8949406
TLC27M9	5962-9060404
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TLC32044M	5962-9086302
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TLC556	5962-8950302
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TLE2022	5962-9088102
TLE2024	5962-9088103
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TLE2037M	5962-9089602
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TLE2062M	5962-9080801
TLE2064	5962-9080901
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TMC2011V	5962-8944601
TMC2023V	5962-8971101
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TMC208KV1	5962-8873902
TMC2111V	5962-8944602
TMC2208J4V	5962-9070801
TMC2301	5962-8971501
TMC2301	5962-8971502
TMC2310V	5962-9096301
TMC2310V1	5962-9096302
TMC28KUV	5962-8873903
TMC28KUV1	5962-8873904
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TMS4050	/23504
TMS4060	/23501
TMS4060	/23503
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TSC427	5962-8850302
TSC428	5962-8850303
TSC429	5962-8877001
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TSC4423	5962-8850304
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TSC4428	5962-8850309
TSC4429	5962-8877002
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UC1611	5962-9053801
UC1625	5962-9168901
UC1633	5962-9098701
UC1637	5962-8995701
UC1706	5962-8961101
UC1707	5962-8761901
UC1838A	5962-8989901
UC1840	5962-8992001
UC1841	5962-8992002
UC1846	5962-8680601
UC1864	5962-9203101
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UCS5822	5962-8764101
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UDS2983	5962-8851902
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UH-432-1	5962-8960402
UH-507	5962-8986701
UH-508	5962-8550001
UH-532	5962-8960403
UH502	5962-8856401
UH503	5962-8855101
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UT1553BCRTMP	5962-8950101
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UT1553BRTIA	/55502
UT1553BRTR	5962-8957601
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UT63M115	5962-8864403
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UT63M125	5962-8864405
UT63M127	5962-8864406
UT63M135	5962-8864407
UT63M137	5962-8864408
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V2500H	5962-9154501
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V2500H	5962-9154601
V2500H	5962-9154602
V2500H	5962-9154603
V2500L	5962-9154503
V750	5962-8872601
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V750L	5962-8872607
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VFC320	/13802
VIC068A	5962-9201001
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WE-128K8-200	5962-9315401
WE-256K8-150	5962-9315502
WE-256K8-200	5962-9315501
WE-512K8-200	5962-9309104
WE-512K8-250	5962-9309103
WE-512K8-300	5962-9309102
WE512K8150CQ	5962-9309101
WEDSP-16	5962-9070401
WS-128K8-100	5962-9315602
WS-128K8-120	5962-9315601
WS-128K8-25C	5962-9315608
WS-128K8-35C	5962-9315607
WS-128K8-45C	5962-9315606
WS-128K8-55C	5962-9315605
WS-128K8-70C	5962-9315604
WS-128K8-85C	5962-9315603
WS-256K8-100	5962-9315702
WS-256K8-120	5962-9315701
WS-256K8-25C	5962-9315708
WS-256K8-35C	5962-9315707
WS-256K8-45C	5962-9315706
WS-256K8-55C	5962-9315705
WS-256K8-70C	5962-9315704
WS-256K8-85C	5962-9315703
WS512K8-25CQ	5962-9207808
WS512K8-35CQ	5962-9207807
WS512K8-45CQ	5962-9207806
WS512K8-55CQ	5962-9207805
WS512K8-70CQ	5962-9207804
WS512K8-85CQ	5962-9207803
WS512K8100CQ	5962-9207802
WS512K8120CQ	5962-9207801
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X2816A-35	/22702
X2816A-45	/22701
X2864A-25	/22804
X2864A-25	/22806
X2864A-30	/22803
X2864A-35	/22802
X2864A-35	/22805
X2864A-45	/22801
XR2211M	5962-7705001
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Z-80BCMOS	/48501
Z-80BCPU	/48003
Z-80CPU	/48002
Z-80SIO/2	/48102
Z08400	5962-3848001
Z08400	5962-3848002
Z08400	5962-3848003
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Z0853006	5962-8752701
Z0858106	5962-8752602
Z0858110	5962-8752601
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Z8001ACPU	5962-8000303
Z8001B	5962-8000304
Z8001CPU	/52001
Z8001CPU	5962-8000301
Z8002ACPU	/52004
Z8002ACPU	5962-8000306
Z8002B	5962-8000305
Z8002CPU	/52002
Z8002CPU	5962-8000302
Z8030	5962-8551802
Z8030A	5962-8551801
Z8036	5962-8551702
Z8036A	5962-8551701
Z80ACTC	/48301
Z80ADMA	/48201
Z80APIO	/48401
Z80ASIO/2	/48101
Z80CTC	/48302
Z80DMA	/48202
Z80PIO	/48402
Z8420	5962-8418602
Z8420A	5962-8418601
Z8430	5962-8301602
Z8430A	5962-8301601
Z8442	5962-8301502
Z8442A	5962-8301501
Z84C2006	5962-8951401
Z84C3006	5962-8951501
Z84C4206	5962-8951601
Z8523008	5962-8868910
Z8523010	5962-8868908
Z8523016	5962-8868909
Z8536	5962-8300101
Z8536A	5962-8300102
Z85C3006	5962-8868901
Z85C3006SCC	/48601
Z85C3008	5962-8868902
Z85C3008SCC	/48602
Z85C3010	5962-8868907

*Part numbers beginning with a slash "/" are MIL-M-38510 numbers. All others are DESC drawing numbers.

MILITARY PARTS
SORTED BY GENERIC MILITARY P/N

Military* P/N	Industry PN
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/00204	5476
/00205	5474
/00206	5470
/00207	5479
/00301	5440
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/00401	5402
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/00404	5427
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/00503	5453
/00504	5454
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/01801	54170
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/02302	54H20
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/02307	54H22
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/02804	93L00
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/07905	54S251
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/10105	LH2101A
/10106	LH2108A
/10107	LM118
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/10705	LM140H-24
/10706	LM140K-05
/10707	LM140K-12
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/11005	LM124
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/11104	DG185A
/11105	DG187A
/11106	DG188A
/11107	DG190A
/11108	DG191A
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/11406	LF157A
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/11503	LM120H-15
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/11507	LM120K-15
/11508	LM120K-24
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/11703	LM117H
/11704	LM117K
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/11801	79MG
/11802	79G
/11803	LM137H
/11804	LM137K
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/12203	2620
/12204	2500
/12205	2510
/12206	2520
/12207	OP44A
/12208	OP-42
/12301	200
/12302	201
/12401	LM199A
/12402	LM129A
/12403	REF10A
/12404	LM199
/12405	LM199A-20
/12406	LM129B
/12407	10215
/12408	10217
/12409	102110
/12501	198
/12502	5537
/12601	1524
/12602	1525A
/12603	1526
/12604	1527A

*Part numbers beginning with a slash "/" are MIL-M-38510 numbers. All others are DESC drawing numbers.

MILITARY PARTS
SORTED BY GENERIC MILITARY P/N

Military* P/N	Industry PN	Military* P/N	Industry PN	Military* P/N	Industry PN	Military* P/N	Industry PN	Military* P/N	Industry PN
/12701	7523	/15802	9317	/21005	76165	/23902	6518	/29306	7C196
/12702	7520	/15901	9300	/21101	82HS321A	/24001	2117	/29307	7C198
/12703	7521	/15902	9328	/21102	53S3281	/24002	2117	/29308	7C198
/12704	7541	/16001	9334	/21103	29671	/24003	4116	/29309	7C198
/12705	1020	/16101	5432	/21201	93Z665-70	/24004	45H16	/29310	7C197
/12706	1220	/16201	5428	/21202	93Z665-55	/24005	45H16	/29311	7C194
/12707	1218	/16301	54365	/21203	93Z665-50	/24401	6665	/29312	MT5C2565
/12801	584S	/16302	54366	/21204	93Z665-45	/24402	6665	/29313	7C198
/12802	584T	/16303	54367	/21901	6654	/24403	6665	/29314	MT5C2565
/12901	55450	/16304	54368	/22001	2708	/24501	6504	/29315	MT5C2565
/12902	55451	/17001	4081B	/22101	2716	/24502	6514	/29316	7C196
/12903	55452	/17002	4082B	/22201	2532	/24503	6504RH	/29317	MT5C2568
/12904	55453	/17003	4073B	/22401	27256-250	/24504	6514RH	/29318	7C197
/12905	55454	/17101	4071B	/22402	27256-200	/24505	CMM5104	/29319	7C194
/12906	55460	/17102	4072B	/22403	27256-170	/24506	CMM5114	/29320	MT5C2565
/12907	55461	/17103	4075B	/22601	NMC2816	/24601	M41256P-12	/29321	MT5C2565
/12908	55462	/17201	4085B	/22701	X2816A-45	/24602	M41256P-15	/29322	MT5C2565
/12909	55463	/17202	4086B	/22702	X2816A-35	/24603	M41256N-12	/29323	MT5C2565
/12910	55464	/17203	4070B	/22703	X2816A-30	/24604	M41256N-15	/29324	MT5C2565
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/13002	55326	/17301	4514B	/22801	X2864A-45	/24902	411024-100	/29326	MT5C2568
/13003	55327	/17302	4515B	/22802	X2864A-35	/24903	411024-120	/29327	MT5C2568
/13101	5534A	/17303	4532B	/22803	X2864A-30	/24904	4C1024-150	/29328	MT5C2568
/13102	5532A	/17304	4555B	/22804	X2864A-25	/25001	MKB4501-81	/29329	7C194
/13301	561	/17305	4556B	/22805	X2864A-35	/25002	MKB4501-80	/29330	7C194
/13401	AD571	/17401	4069UB	/22806	X2864A-25	/25003	MKB4501-88	/29331	7C194
/13501	OP-07A	/17402	40107B	/22807	2864-350	/26001	28C64-350	/29332	7C194
/13502	714	/17403	4502B	/22808	2864-250	/26002	28C64-300	/29333	7C197
/13503	OP-27A	/17404	40109B	/22809	2864H-250	/26003	28C64-250	/29334	7C197
/13504	OP-227A	/17501	4076B	/22810	5564-250	/26004	28C64-200	/29335	7C197
/13505	OP-37A	/17502	4095B	/22811	5564-250	/26005	55C64-250	/29336	7C197
/13601	R675B-4	/17503	4096B	/23001	93410	/26006	28C65-250	/30001	54LS00
/13602	R675B-3	/17504	4098B	/23002	93421	/26007	28C65-350	/30002	54LS03
/13701	DAC87	/17505	40174B	/23003	93411	/26101	28C256-350	/30003	54LS04
/13702	DAC87	/17601	4099B	/23004	93L420	/26102	28C256-300	/30004	54LS05
/13703	DAC87	/17602	4508B	/23101	93415	/26103	28C256-250	/30005	54LS10
/13801	VFC32	/17701	4093B	/23102	93425	/26104	28C256-200	/30006	54LS12
/13802	VFC320	/17702	40106B	/23103	93L415	/26105	28C256-150	/30007	54LS20
/13803	AD650	/17801	4067B	/23104	93L425	/26106	28C256-250	/30008	54LS22
/13901	534T	/17802	4097B	/23105	93415	/26107	28C256-350	/30009	54LS30
/13902	534S	/17803	40257B	/23106	93425	/26108	28C256-300	/30101	54LS73
/13903	532S	/19001	506	/23107	93415	/26109	28C256-250	/30102	54LS74A
/13904	4213	/19002	506A	/23108	93425A	/26110	28C256-200	/30103	54LS112
/14001	574AU	/19003	507	/23109	93412	/26111	28C256-150	/30104	54LS113
/14002	574AT	/19004	507A	/23110	93422	/26112	28C256-250	/30105	54LS114
/14003	574AU	/19005	508A	/23111	93L412	/26501	(SEE DWG)	/30106	54LS174
/14004	574AT	/19006	509A	/23112	93L422	/26502	(SEE DWG)	/30107	54LS175
/14005	674AU	/19007	508	/23113	93L425A	/26503	(SEE DWG)	/30108	54LS107
/14006	674AT	/19008	509	/23114	93422A	/26504	(SEE DWG)	/30109	54LS109
/14101	2001	/20101	HPROM-512	/23115	93L422A	/26505	(SEE DWG)	/30110	54LS76A
/14102	2002	/20102	MCM5304	/23201	93419	/26506	(SEE DWG)	/30201	54LS40
/14103	2003	/20201	IM5603A	/23301	93470	/26507	(SEE DWG)	/30202	54LS37
/14104	2004	/20202	IM5623	/23302	93471	/26508	(SEE DWG)	/30203	54LS38
/14105	2005	/20301	93417	/23501	TMS4060	/26509	(SEE DWG)	/30204	54LS28
/14106	2801	/20302	93427	/23502	TMS4050	/26510	(SEE DWG)	/30301	54LS02
/14107	2802	/20303	82S126A	/23503	TMS4060	/27401	27HC64-170	/30302	54LS27
/14108	2803	/20304	82S129A	/23504	TMS4050	/27402	27HC64-155	/30303	54LS266
/14109	2804	/20401	5305-1	/23505	MM5280	/27501	27C64-350	/30401	54LS51
/14110	2805	/20402	5306-1	/23506	MM5280	/27502	27C64-250	/30402	54LS54
/14201	HTC-0300	/20403	82S130A	/23601	MCM6605	/27503	27C64-200	/30501	54LS32
/14301	AD524S	/20404	82S131A	/23602	MCM6604A	/27601	27C256-250	/30502	54LS86
/14401	AD558T	/20601	54S572	/23603	MCM6605	/27602	27C256-200	/30601	54LS194A
/14801	TL431	/20602	7643	/23604	MCM6604A	/28901	7C147	/30602	54LS195A
/14802	LT1009	/20603	7644	/23701	AM9130CFC	/28902	7C148	/30603	54LS95B
/14901	TLC555	/20604	82S137A	/23702	AM9130AFC	/28903	2147	/30604	54LS96
/14902	TLC556	/20701	7602	/23703	AM9130CFM	/28904	2148	/30605	54LS164
/14903	7555	/20702	7603	/23704	AM9130AFM	/29101	6116	/30606	54LS295B
/14904	7556	/20703	82S23A	/23705	AM91L30CF	/29102	6516	/30607	54LS395A
/14905	LMC555	/20704	82S123A	/23706	AM91L30AF	/29103	65262	/30608	54LS165A
/15001	5485	/20801	7640	/23707	AM91L30CFM	/29104	6116	/30609	54LS166
/15002	9324	/20802	7641	/23708	AM91L30AFM	/29105	6116	/30701	54LS138
/15101	5413	/20803	82S115	/23709	AM9140CFC	/29106	51C67	/30702	54LS139
/15102	5414	/20804	5348-1	/23710	AM9140AFC	/29107	65C262RH	/30703	54LS42
/15103	54132	/20805	5349-1	/23711	AM9140CFM	/29108	65T262RH	/30704	54LS47
/15201	54154	/20901	7684	/23712	AM9140AFM	/29109	65262	/30801	54LS181
/15202	54155	/20902	53S841	/23713	AM91L40CFC	/29110	65162	/30901	54LS151
/15203	54156	/20903	7680	/23714	AM91L40AFC	/29201	7187S55	/30902	54LS153
/15204	8250	/20904	7681	/23715	AM91L40CFM	/29202	7187S45	/30903	54LS157
/15205	8251	/20905	82S2708	/23716	AM91L40AFM	/29203	7187L55	/30904	54LS158
/15206	8252	/20906	93Z460	/23801	2147	/29204	7187L70	/30905	54LS251
/15301	54125	/20908	29651	/23802	2114	/29205	65642	/30906	54LS257B
/15302	54126	/20909	93Z451	/23803	2147H	/29206	65643	/30907	54LS258B
/15601	54147	/20910	82S185A	/23804	2114A	/29301	7C197	/30908	54LS253
/15602	54148	/21001	77S190	/23805	2147H-3	/29302	7C197	/30909	54LS298
/15603	9318	/21002	93Z511	/23806	2148H	/29303	7C194	/31001	54LS11
/15701	9338	/21003	93Z510	/23807	2147H-2	/29304	7C194	/31002	54LS15
/15801	9321	/21004	28S166A	/23901	6508	/29305	7C196	/31003	54LS21

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MILITARY PARTS
SORTED BY GENERIC MILITARY P/N

Military* P/N	Industry PN	Military* P/N	Industry PN	Military* P/N	Industry PN	Military* P/N	Industry PN	Military* P/N	Industry PN
/31004	54LS08	/33905	54F251A	/38204	54ALS880	/50315	PAL10L8A	/60607	(SEE DWG)
/31005	54LS09	/33906	54F257A	/38301	54ALS240A	/50316	PAL12L6A	/60608	(SEE DWG)
/31101	54LS85	/33907	54F258A	/38302	54ALS241	/50317	PAL14L4A	/60609	(SEE DWG)
/31201	54LS83A	/33908	54F253	/38303	54ALS244A	/50318	PAL16L2A	/60610	(SEE DWG)
/31202	54LS283	/33909	54F352	/38401	54ALS37	/50319	PAL10H8A2	/60611	(SEE DWG)
/31301	54LS13	/33910	54F353	/38402	54ALS1002	/50320	PAL12H6A2	/60612	(SEE DWG)
/31302	54LS14	/34001	54F08	/38403	54ALS1003	/50321	PAL14H4A2	/60613	(SEE DWG)
/31303	54LS132	/34002	54F11	/38404	54ALS1008A	/50322	PAL16H2A2	/60614	(SEE DWG)
/31401	54LS123	/34101	54F074	/38405	54ALS1010A	/50323	PAL16C1A2	/60615	(SEE DWG)
/31402	54LS221	/34102	54F109	/38406	54ALS1011	/50324	PAL10L8A2	/60616	(SEE DWG)
/31403	54LS122	/34103	54F112	/38407	54ALS1020	/50325	PAL12L6A2	/60617	(SEE DWG)
/31501	54LS90	/34104	54F175	/38408	54ALS1032	/50326	PAL14L4A2	/60618	(SEE DWG)
/31502	54LS93	/34105	54F374	/38409	54ALS1004	/50327	PAL16L2A2	/60619	(SEE DWG)
/31503	54LS160A	/34106	54F534	/38410	54ALS1005	/50401	PAL16L8A	/60620	(SEE DWG)
/31504	54LS161	/34107	54F174	/38411	54ALS1034	/50402	PAL16R8A	/60701	(SEE DWG)
/31505	54LS168	/34108	54F378	/38412	54ALS1035	/50403	PAL16R6A	/60702	(SEE DWG)
/31506	54LS169	/34109	54F379	/38501	54ALS640A	/50404	PAL16R4A	/60703	(SEE DWG)
/31507	54LS192	/34110	54F574	/38502	54ALS641	/50405	PAL16X4	/60704	(SEE DWG)
/31508	54LS193	/34111	54F564	/38503	54ALS642	/50406	PAL16A4	/60705	(SEE DWG)
/31509	54LS191	/34201	54F283	/38504	54ALS643	/50407	PAL16L8A2	/60706	(SEE DWG)
/31510	54LS92	/34301	54F161A	/38505	54ALS645A	/50408	PAL16R8A2	/60707	(SEE DWG)
/31511	54LS162A	/34302	54F163A	/38506	54ALS242B	/50409	PAL16R6A2	/60708	(SEE DWG)
/31512	54LS163A	/34303	54F191	/38507	54ALS243A	/50410	PAL16R4A2	/60709	(SEE DWG)
/31513	54LS190	/34304	54F193	/40001	6800	/50501	PAL20L8A	/60710	(SEE DWG)
/31601	54LS75	/34401	54F160A	/40101	MC6821	/50502	PAL20R8A	/60711	(SEE DWG)
/31602	54LS279	/34402	54F162A	/40201	6810	/50503	PAL20R6A	/60712	(SEE DWG)
/31603	54LS259	/34403	54F190	/40301	6831B	/50504	PAL20R4A	/60713	(SEE DWG)
/31604	54LS375	/34404	54F192	/42001	8080A	/50601	PAL16L8B	/60714	(SEE DWG)
/31605	54LS259B	/34501	54F86	/42101	8212	/50602	PAL16R8B	/60715	(SEE DWG)
/31801	54LS261	/34601	54F373	/42201	8224	/50603	PAL16R6B	/60716	(SEE DWG)
/31901	54LS670	/34602	54F533	/42301	8228	/50604	PAL16R4B	/60717	(SEE DWG)
/31902	54LS170	/34603	54F563	/44001	2901C	/50605	PAL16L8B2	/60718	(SEE DWG)
/32001	54LS196	/34604	54F573	/44101	2905	/50606	PAL16R8B2	/60719	(SEE DWG)
/32002	54LS197	/34701	54F521	/44102	2906	/50607	PAL16R6B2	/60720	(SEE DWG)
/32003	54LS290	/34801	54F242	/44103	2907	/50608	PAL16R4B2	/60801	(SEE DWG)
/32004	54LS293	/34802	54F243	/44104	2915	/50609	PAL16L8-15	/60802	(SEE DWG)
/32102	54LS26	/34803	54F245	/44105	2916	/50610	PAL16R8-15	/60803	(SEE DWG)
/32201	54LS365	/34804	54F545	/44106	2917	/50611	PAL16R6-15	/60804	(SEE DWG)
/32202	54LS366	/34901	54F280	/44201	2918	/50612	PAL16R4-15	/60805	(SEE DWG)
/32203	54LS367	/35001	54F398	/46001	9900A	/50701	C22V10	/60806	(SEE DWG)
/32204	54LS368	/35002	54F399	/46501	SBP9989	/50702	C22V10	/60807	(SEE DWG)
/32301	54LS125A	/35101	54F365	/47001	1802D	/50703	C22V10	/60808	(SEE DWG)
/32302	54LS126	/35201	54F37	/47101	1821	/50704	C22V10	/60809	(SEE DWG)
/32401	54LS240	/35202	54F38	/47102	1822	/50801	C22V10-30	/60810	(SEE DWG)
/32402	54LS241	/35203	54F40	/47201	1832	/50802	C22V10-25	/60811	(SEE DWG)
/32403	54LS244	/36001	54LS148	/47301	1852	/50803	C22V10-20	/60812	(SEE DWG)
/32404	54LS540	/36002	54LS348	/47401	1853	/50804	C22V10-15	/60813	(SEE DWG)
/32405	54LS541	/36101	54LS173A	/47601	1856	/52001	Z8001CPU	/60814	(SEE DWG)
/32501	54LS273	/37001	54ALS00A	/47602	1857	/52002	Z8002CPU	/60815	(SEE DWG)
/32502	54LS373	/37002	54ALS10	/48001	Z-80ACPU	/52003	Z8001ACPU	/60816	(SEE DWG)
/32503	54LS374	/37003	54ALS20A	/48002	Z-80CPU	/52004	Z8002A CPU	/60817	(SEE DWG)
/32504	54LS377	/37004	54ALS30A	/48003	Z-80BCPU	/53001	8086	/60818	(SEE DWG)
/32601	54LS155	/37005	54ALS133	/48101	Z80ASIO/2	/54001	68000-6	/60819	(SEE DWG)
/32602	54LS156	/37006	54ALS04B	/48102	Z-80SIO/2	/54002	68000-8	/60820	(SEE DWG)
/32701	54LS390	/37101	54ALS74A	/48201	Z80ADMA	/54003	68000-10	/61001	6516-1
/32702	54LS393	/37102	54ALS109A	/48202	Z80DMA	/55201	32C201-10	/61002	6516-2
/32703	54LS490	/37103	54ALS112A	/48301	Z80ACTC	/55501	UT1553BRTI	/61003	6516-3
/32801	54LS242	/37104	54ALS574A	/48302	Z80CTC	/55502	UT1553BRTIA	/61301	51C98-35
/32802	54LS243	/37105	54ALS576A	/48401	Z80APIO	/60001	(SEE DWG)	/61302	51C98-45
/32803	54LS245	/37106	54ALS874B	/48402	Z80PIO	/60002	(SEE DWG)	/61303	51C98-55
/32804	54LS646	/37107	54ALS876	/48501	Z-80BCMOS	/60003	(SEE DWG)	/61501	1HC34-25
/32805	54LS648	/37201	54ALS174	/48601	Z85C3006SCC	/60501	(SEE DWG)	/61502	1HC34-20
/32901	54LS280	/37202	54ALS175	/48602	Z85C3008SCC	/60502	(SEE DWG)	/61503	1HC34-15
/33001	54F00	/37203	54ALS373	/49001	8048	/60503	(SEE DWG)	/61504	1HC34-25
/33002	54F04	/37204	54ALS374	/49002	8035L	/60504	(SEE DWG)	/61505	1HC34-20
/33003	54F10	/37301	54ALS02	/50001	TDC1008C1V	/60505	(SEE DWG)	/61506	1HC34-15
/33004	54F20	/37302	54ALS27	/50002	TDC1009C1V	/60506	(SEE DWG)	/61601	TVB382
/33106	25LS174	/37401	54ALS08	/50003	TDC1010C1V	/60507	(SEE DWG)	/62001	(SEE DWG)
/33107	25LS175	/37402	54ALS11	/50004	MPY008HC2V	/60508	(SEE DWG)	/62002	(SEE DWG)
/33201	54F240	/37501	54ALS32	/50005	MPY012HC1V	/60509	(SEE DWG)	/63001	BFRP10
/33202	54F241	/37601	54ALS299	/50006	MPY016HC1V	/60510	(SEE DWG)	/65001	54HC00
/33203	54F244	/37602	54ALS323	/50201	82S101	/60511	(SEE DWG)	/65002	54HC10
/33204	54F540	/37701	54ALS138	/50202	82S100	/60512	(SEE DWG)	/65003	54HC20
/33301	54F02	/37901	54ALS857A	/50301	PAL10H8	/60513	(SEE DWG)	/65004	54HC30
/33401	54F64	/38001	54ALS161B	/50302	PAL12H6	/60514	(SEE DWG)	/65005	54HC132
/33501	54F32	/38002	54ALS163B	/50303	PAL14H4	/60515	(SEE DWG)	/65101	54HC02
/33601	54F194	/38003	54ALS169B	/50304	PAL16H2	/60516	(SEE DWG)	/65102	54HC27
/33701	54F138	/38004	54ALS561A	/50305	PAL16C1	/60517	(SEE DWG)	/65103	54HC266
/33702	54F139	/38005	54ALS569A	/50306	PAL10L8	/60518	(SEE DWG)	/65104	54HC4002
/33801	54F181	/38101	54ALS160	/50307	PAL12L6	/60519	(SEE DWG)	/65105	54HC7266
/33802	54F182	/38102	54ALS162A	/50308	PAL14L4	/60520	(SEE DWG)	/65201	54HC32
/33803	54F381	/38103	54ALS168	/50309	PAL16L2	/60601	(SEE DWG)	/65202	54HC86
/33804	54F382	/38104	54ALS560	/50310	PAL10H8A	/60602	(SEE DWG)	/65203	54HC08
/33901	54F151A	/38105	54ALS568	/50311	PAL12H6A	/60603	(SEE DWG)	/65204	54HC11
/33902	54F153	/38201	54ALS573	/50312	PAL14H4A	/60604	(SEE DWG)	/65301	54HC73
/33903	54F157A	/38202	54ALS580	/50313	PAL16H2A	/60605	(SEE DWG)	/65302	54HC74
/33904	54F158A	/38203	54ALS873	/50314	PAL16C1A	/60606	(SEE DWG)	/65303	54HC107

*Part numbers beginning with a slash "/" are MIL-M-38510 numbers. All others are DESC drawing numbers.

MILITARY PARTS
SORTED BY GENERIC MILITARY P/N

Military* P/N	Industry PN
/65304	54HC109
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/66503	54HC166
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/76302	54AC161
/76304	54AC163
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/76506	54AC299
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5962-7601701	54LS253
5962-7601801	54LS279
5962-7601901	54LS298
5962-7602001	54LS26
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5962-7603201	54LS90
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5962-7603701	54LS257B
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5962-7604201	54LS221
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5962-7604501	54LS47
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5962-7700201	8080A
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5962-7700801	LM139
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5962-7702701	4069UB
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5962-7702803	LM103H-2.2
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5962-7702805	LM103H-2.7
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5962-7702809	LM103H-3.9
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5962-7702811	LM103H-4.7
5962-7702812	LM103H-5.1
5962-7702813	LM103H-5.6
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5962-7703101	4060A
5962-7703201	4515B
5962-7703301	CA3130BT
5962-7703401	LM117
5962-7703402	LM117HV
5962-7703403	LM137
5962-7703404	LM137HV
5962-7703405	LT117A
5962-7703406	LT137A
5962-7703407	LT117AHV
5962-7703408	LT137AHV
5962-7703501	4514B
5962-7703601	54C08
5962-7703701	54C85
5962-7703702	4585B
5962-7703901	4250
5962-7704001	LM120H-05
5962-7704003	LM120H-12
5962-7704004	LM120H-15
5962-7704005	LM120H-24
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5962-7704201	54LS670
5962-7704301	LM124
5962-7704302	LM124A
5962-7704401	4078B
5962-7704402	4078B
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5962-7704601	4093B
5962-7704602	4093B
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5962-7704901	55452
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5962-7800304	1536
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5962-7801503	27S07
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5962-7802001	26LS32
5962-7802002	26LS33
5962-7802003	26LS32A
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5962-8001801	54LS168
5962-8001802	54LS169
5962-8001901	54LS09
5962-8002001	54LS242
5962-8002002	54LS243
5962-8002101	54LS245
5962-8002201	54S251
5962-8002301	54S258
5962-8002501	54LS170
5962-8002601	54LS261
5962-8003701	LM106
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5962-8100603	IH5042
5962-8100604	IH5043
5962-8100605	IH5044
5962-8100606	DG5145
5962-8100607	IH5046
5962-8100608	IH5047
5962-8100609	DG5140
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5962-8100615	HI5046
5962-8100616	HI5047
5962-8100617	HI5046A
5962-8100618	HI5047A
5962-8100619	HI5048
5962-8100620	HI5049
5962-8100621	HI5050
5962-8100622	HI5051
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5962-8100802	563
5962-8101501	(SEE DWG)
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5962-8101602	4029B
5962-8101701	4035B
5962-8101702	14035B
5962-8101801	4053B
5962-8101802	14053B
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*Part numbers beginning with a slash "/" are MIL-M-38510 numbers. All others are DESC drawing numbers.

MILITARY PARTS
SORTED BY GENERIC MILITARY P/N

Military* P/N	Industry PN	Military* P/N	Industry PN	Military* P/N	Industry PN	Military* P/N	Industry PN	Military* P/N	Industry PN
5962-8102001	4047B	5962-8202102	68000-8	5962-8405701	2901C	5962-8417904	8283	5962-8515401	54HC107
5962-8102002	4047B	5962-8202103	68000-10	5962-8405901	54ALS1000A	5962-8418001	LM136A-2.5	5962-8515501	PAL16L8-20
5962-8102101	54LS629	5962-8202104	68000-12	5962-8406001	54ALS1010A	5962-8418002	LM136A-5.0	5962-8515502	PAL16R8-20
5962-8102301	061	5962-8202201	40174B	5962-8406101	54ALS1004	5962-8418501	733	5962-8515503	PAL16R6-20
5962-8102302	062	5962-8202501	(SEE DWG)	5962-8406201	54HC138	5962-8418502	592	5962-8515504	PAL16R4-20
5962-8102303	064	5962-8202502	(SEE DWG)	5962-8406401	54HC147	5962-8418601	Z8420A	5962-8515505	PAL16L8-30
5962-8102304	071	5962-8202503	(SEE DWG)	5962-8406501	82C54	5962-8418602	Z8420	5962-8515506	PAL16R8-30
5962-8102305	072	5962-8202504	(SEE DWG)	5962-8406502	82C54-12	5962-8419001	8751H-8	5962-8515507	PAL16R6-30
5962-8102306	074	5962-8202505	(SEE DWG)	5962-8406601	82C55A-5	5962-8419002	8751H	5962-8515508	PAL16R4-30
5962-8102401	(SEE DWG)	5962-8202506	(SEE DWG)	5962-8406602	82C55A	5962-8500101	54HC365	5962-8515509	PAL16L8-15
5962-8102402	(SEE DWG)	5962-8202507	(SEE DWG)	5962-8406701	82C82	5962-8500201	54HC367	5962-8515510	PAL16R8-15
5962-8102403	(SEE DWG)	5962-8202508	(SEE DWG)	5962-8406702	82C83	5962-8500301	54HC4020	5962-8515511	PAL16R6-15
5962-8102404	(SEE DWG)	5962-8202509	(SEE DWG)	5962-8406801	82C84A	5962-8500401	54HC4040	5962-8515512	PAL16R4-15
5962-8102405	(SEE DWG)	5962-8203601	OP-07A	5962-8406802	82C84A	5962-8501001	M80186-8	5962-8515513	PAL16L8A-12
5962-8102406	(SEE DWG)	5962-8203602	OP-07	5962-8406901	82C88	5962-8501002	M80186-6	5962-8515514	PAL16R8A-12
5962-8102407	(SEE DWG)	5962-8300101	Z8536	5962-8407001	54HC75	5962-8501501	82C52	5962-8515515	PAL16R6-12
5962-8102801	6N134	5962-8300102	Z8536A	5962-8407101	54HC374	5962-8501601	82C59A-5	5962-8515516	PAL16R4-12
5962-8102802	HCPL-5631	5962-8300201	DAC87	5962-8407201	54HC373	5962-8501602	82C59A	5962-8515517	PAL16L8-10
5962-8102803	HCPL-6631	5962-8300301	DAC87	5962-8407301	54HC174	5962-8503001	2700	5962-8515518	PAL16R8-10
5962-8103501	PAL10H8	5962-8301301	NSC800	5962-8407401	54HC240	5962-8503002	2700U	5962-8515519	PAL16R6-10
5962-8103502	PAL12H6	5962-8301302	NSC800-4	5962-8407501	54HC161	5962-8503003	2702S	5962-8515520	PAL16R4-10
5962-8103503	PAL14H4	5962-8301501	Z8442A	5962-8407901	54ALS162	5962-8503004	2702U	5962-8550001	UH-508
5962-8103504	PAL16H2	5962-8301502	Z8442	5962-8408501	54HC245	5962-8503005	2701	5962-8550101	40106B
5962-8103505	PAL16C1	5962-8301601	Z8430A	5962-8408801	54HC112	5962-8503006	2701	5962-8550102	14584
5962-8103506	PAL10L8	5962-8301602	Z8430	5962-8408901	54HC175	5962-8506301	8097	5962-8550201	8X305
5962-8103507	PAL12L6	5962-8301701	54LS154	5962-8409001	54HC243	5962-8506401	80C31BH	5962-8550202	8X305-10
5962-8103508	PAL14L4	5962-8301901	54ALS174	5962-8409101	54HC14	5962-8506402	80C51BH	5962-8550301	8X320
5962-8103509	PAL16L2	5962-8301902	54ALS175	5962-8409201	54HC139	5962-8506403	80C31BH-16	5962-8550401	54HCT138
5962-8103510	PAL10H8A	5962-8302001	54ALS373	5962-8409301	54HC153B	5962-8506404	80C51BH-16	5962-8550501	54HCT240
5962-8103511	PAL12H6A	5962-8302002	54ALS374	5962-8409401	54HC162	5962-8506501	PAL16L8A-4	5962-8550601	54HCT245
5962-8103512	PAL14H4A	5962-8302101	54ALS299	5962-8409501	54HC165	5962-8506502	PAL16R8A-4	5962-8550701	54HCT374
5962-8103513	PAL16H2A	5962-8302102	54ALS323	5962-8409601	54HC244	5962-8506503	PAL16R6A-4	5962-8550801	54LS353
5962-8103514	PAL10L8A	5962-8302201	54ALS161B	5962-8409701	54ALS1008A	5962-8506504	PAL16R4A-4	5962-8551101	54F245
5962-8103515	PAL12L6A	5962-8302202	54ALS163B	5962-8409801	54HC04	5962-8508401	54LS145	5962-8551401	REF02A
5962-8103516	PAL14L4A	5962-8302203	54ALS561A	5962-8409901	54HC273	5962-8508701	LH0041	5962-8551402	REF02
5962-8103517	PAL16L2A	5962-8302401	6N140A	5962-8410001	54HC393	5962-8508801	LH0021	5962-8551501	1526
5962-8103601	PAL16L8	5962-8302501	54ALS169B	5962-8410901	431	5962-8508901	LH0101A	5962-8551502	1526A
5962-8103602	PAL16R8	5962-8302502	54ALS569A	5962-8411101	27256-35	5962-8508902	LH0101	5962-8551701	Z8036A
5962-8103603	PAL16R6	5962-8400001	54ALS109A	5962-8411102	27256-250	5962-8509601	54ALS253	5962-8551702	Z8036
5962-8103604	PAL16R4	5962-8400002	54ALS112A	5962-8411103	27256-200	5962-8509701	54ALS257	5962-8551801	Z8030A
5962-8103605	PAL16X4	5962-8400101	54ALS574A	5962-8411104	27256-170	5962-8510201	27C64-25	5962-8551802	Z8030
5962-8103606	PAL16A4	5962-8400102	54ALS576A	5962-8411105	27256-30	5962-8510202	27C64-35	5962-8551901	54HC259
5962-8103607	PAL16L8A	5962-8401001	54ALS874B	5962-8412801	54HC151B	5962-8510203	27C64-20	5962-8552001	8397
5962-8103608	PAL16R8A	5962-8401002	54ALS876	5962-8412901	PAL20L8A	5962-8510204	27C64-90	5962-8552301	9513A
5962-8103609	PAL16R6A	5962-8401101	54ALS74A	5962-8412902	PAL20R8A	5962-8510205	27C64-12	5962-8552501	(SEE DWG)
5962-8103610	PAL16R4A	5962-8401201	54ALS573	5962-8412903	PAL20R6A	5962-8510206	27C64-15	5962-8552502	(SEE DWG)
5962-8103611	PAL16L8A-2	5962-8401202	54ALS580	5962-8412904	PAL20R4A	5962-8510207	57C64-70	5962-8552503	(SEE DWG)
5962-8103612	PAL16R8A-2	5962-8401301	54ALS242B	5962-8412905	PAL20L10A	5962-8512401	54HC257	5962-8552504	(SEE DWG)
5962-8103613	PAL16R6A-2	5962-8401302	54ALS243A	5962-8412906	PAL20X8A	5962-8512501	54HC251B	5962-8552505	(SEE DWG)
5962-8103614	PAL16R4A-2	5962-8403001	54ALS245A	5962-8412907	PAL20X10A	5962-8512601	54LS33	5962-8552506	(SEE DWG)
5962-8103901	(SEE DWG)	5962-8403101	54ALS1034	5962-8412908	PAL20X4A	5962-8512602	54LS28	5962-8552507	(SEE DWG)
5962-8103902	(SEE DWG)	5962-8403201	54ALS873	5962-8412909	PAL20L8A-2	5962-8512701	574AU	5962-8552508	(SEE DWG)
5962-8103903	(SEE DWG)	5962-8403202	54ALS880	5962-8412910	PAL20R8A-2	5962-8512702	574AT	5962-8552509	(SEE DWG)
5962-8103904	(SEE DWG)	5962-8403301	54ALS645A	5962-8412911	PAL20R6A-2	5962-8512703	574AU	5962-8552510	(SEE DWG)
5962-8103905	(SEE DWG)	5962-8403601	(SEE DWG)	5962-8412912	PAL20R4A-2	5962-8512704	574AT	5962-8552511	(SEE DWG)
5962-8103906	(SEE DWG)	5962-8403602	(SEE DWG)	5962-8413201	(SEE DWG)	5962-8512705	574ZA	5962-8552512	(SEE DWG)
5962-8103907	(SEE DWG)	5962-8403603	(SEE DWG)	5962-8413202	(SEE DWG)	5962-8512706	574ZB	5962-8552513	(SEE DWG)
5962-8103908	(SEE DWG)	5962-8403604	(SEE DWG)	5962-8413203	(SEE DWG)	5962-8512707	574AU	5962-8552601	27PS191
5962-8200501	2764-450	5962-8403605	(SEE DWG)	5962-8413204	(SEE DWG)	5962-8512708	574AT	5962-8552602	27PS191A
5962-8200502	2764-250	5962-8403606	(SEE DWG)	5962-8413205	(SEE DWG)	5962-8512801	54HC573	5962-8552603	27PS291
5962-8200503	2764A-35	5962-8403607	(SEE DWG)	5962-8413206	(SEE DWG)	5962-8513001	54HCT244	5962-8552604	27PS291A
5962-8200504	2764A-25	5962-8403608	(SEE DWG)	5962-8413207	(SEE DWG)	5962-8513101	HI546	5962-8552701	27S45
5962-8200505	2764A-20	5962-8403609	(SEE DWG)	5962-8413208	(SEE DWG)	5962-8513102	HI547	5962-8552702	27S45A
5962-8200506	2764-150	5962-8403610	(SEE DWG)	5962-8413209	(SEE DWG)	5962-8513103	HI549	5962-8552703	27S47
5962-8200507	2764-200	5962-8403611	(SEE DWG)	5962-8413401	54ALS153	5962-8513104	IH5116	5962-8552704	27S47A
5962-8200701	4167	5962-8403612	(SEE DWG)	5962-8413501	54ALS251	5962-8513105	IH5216	5962-8552801	82C89
5962-8200702	2167-70	5962-8403613	(SEE DWG)	5962-8413601	54ALS273	5962-8513106	IH5208	5962-8600801	685
5962-8200703	2167-55	5962-8403614	(SEE DWG)	5962-8414101	54ALS151	5962-8513107	HI506	5962-8600802	685
5962-8200704	2167-40	5962-8403615	(SEE DWG)	5962-8414201	54ALS09	5962-8513108	HI507	5962-8600803	6685
5962-8200801	(SEE DWG)	5962-8403616	(SEE DWG)	5962-8414301	54ALS21	5962-8513109	HI509	5962-8600804	96685
5962-8200802	(SEE DWG)	5962-8403701	54HC00	5962-8414501	54ALS832	5962-8513301	80287-10	5962-8600901	54HC390
5962-8200803	(SEE DWG)	5962-8403801	54HC10	5962-8415001	54HC109	5962-8513302	80287-8	5962-8601001	54HCU04
5962-8200804	(SEE DWG)	5962-8403901	54HC20	5962-8415101	54LS682	5962-8513303	80287-5	5962-8601101	54HC4017
5962-8200901	(SEE DWG)	5962-8404001	54HC30	5962-8415201	54LS684	5962-8513501	27512-25	5962-8601201	54HC4024
5962-8200902	(SEE DWG)	5962-8404101	54HC02	5962-8415301	54LS688	5962-8513502	27512-35	5962-8601301	54HC85
5962-8200903	(SEE DWG)	5962-8404201	54HC27	5962-8415401	54LS399	5962-8513503	27512-30	5962-8601401	LM119
5962-8201001	(SEE DWG)	5962-8404301	54HC266	5962-8415501	54LS540	5962-8513504	27512-45	5962-8601402	LT119A
5962-8201002	(SEE DWG)	5962-8404302	54HC7266	5962-8415601	54LS541	5962-8513505	27512-20	5962-8601501	(SEE DWG)
5962-8201003	(SEE DWG)	5962-8404401	54HC4002	5962-8416101	54LS640	5962-8514801	80286-8	5962-8601502	(SEE DWG)
5962-8201004	(SEE DWG)	5962-8404501	54HC32	5962-8416201	54HC164	5962-8514802	80286-6	5962-8601503	(SEE DWG)
5962-8201005	(SEE DWG)	5962-8404601	54HC86	5962-8416901	F9450-15	5962-8514803	80286-10	5962-8601504	(SEE DWG)
5962-8201006	(SEE DWG)	5962-8404701	54HC08	5962-8416902	F9450-F18	5962-8514901	82288-6	5962-8601505	(SEE DWG)
5962-8201007	(SEE DWG)	5962-8404801	54HC11	5962-8416903	F9450-F20	5962-8514902	82288-8	5962-8601506	(SEE DWG)
5962-8201008	(SEE DWG)	5962-8405201	80C86	5962-8416904	F9450-F15	5962-8515201	(SEE DWG)	5962-8601507	(SEE DWG)
5962-8201009	(SEE DWG)	5962-8405202	80C86-2	5962-8417901	8282	5962-8515202	(SEE DWG)	5962-8601508	(SEE DWG)
5962-8201010	(SEE DWG)	5962-8405301	32010	5962-8417902	8283	5962-8515203	(SEE DWG)	5962-8601601	80C88
5962-8202101	68000-6	5962-8405601	54HC74	5962-8417903	8282	5962-8515301	54HC73	5962-8601701	2904

Part numbers beginning with a slash "/" are MIL-M-38510 numbers. All others are DESC drawing numbers.

MILITARY PARTS
SORTED BY GENERIC MILITARY P/N

Military* P/N	Industry PN	Military* P/N	Industry PN	Military* P/N	Industry PN	Military* P/N	Industry PN	Military* P/N	Industry PN
5962-8601801	55500	5962-8670504	(SEE DWG)	5962-8683002	(SEE DWG)	5962-8687502	(SEE DWG)	5962-8751411	(SEE DWG)
5962-8601802	55501	5962-8670505	(SEE DWG)	5962-8683003	(SEE DWG)	5962-8687503	(SEE DWG)	5962-8751412	(SEE DWG)
5962-8602001	27LS00	5962-8670506	(SEE DWG)	5962-8683004	(SEE DWG)	5962-8687504	(SEE DWG)	5962-8751413	(SEE DWG)
5962-8602002	27LS00A	5962-8670507	(SEE DWG)	5962-8683005	(SEE DWG)	5962-8687505	(SEE DWG)	5962-8751414	(SEE DWG)
5962-8602003	27LS01	5962-8670508	(SEE DWG)	5962-8683006	(SEE DWG)	5962-8687506	(SEE DWG)	5962-8751415	(SEE DWG)
5962-8602004	27LS01A	5962-8670509	(SEE DWG)	5962-8683007	(SEE DWG)	5962-8687507	(SEE DWG)	5962-8751416	(SEE DWG)
5962-8602101	68881-12	5962-8670510	(SEE DWG)	5962-8683008	(SEE DWG)	5962-8687508	(SEE DWG)	5962-8751417	(SEE DWG)
5962-8602102	68881-16	5962-8670511	(SEE DWG)	5962-8683009	(SEE DWG)	5962-8687509	(SEE DWG)	5962-8751418	(SEE DWG)
5962-8602103	68881-20	5962-8670512	(SEE DWG)	5962-8683010	(SEE DWG)	5962-8687510	(SEE DWG)	5962-8751419	(SEE DWG)
5962-8602301	82S16	5962-8670513	(SEE DWG)	5962-8683101	54HCT00	5962-8687511	(SEE DWG)	5962-8751420	(SEE DWG)
5962-8602501	29705A	5962-8670514	(SEE DWG)	5962-8683301	54ALS00A	5962-8687512	(SEE DWG)	5962-8751421	(SEE DWG)
5962-8602701	2909A	5962-8670515	(SEE DWG)	5962-8683401	54F243	5962-8687513	(SEE DWG)	5962-8751422	(SEE DWG)
5962-8602801	2911A	5962-8670601	27S35	5962-8683601	54ALS32	5962-8687514	(SEE DWG)	5962-8751423	(SEE DWG)
5962-8602901	2914	5962-8670602	27S35A	5962-8683701	54ALS30A	5962-8687515	(SEE DWG)	5962-8751424	(SEE DWG)
5962-8603001	2940	5962-8670603	27S37	5962-8683801	54ALS27	5962-8687516	(SEE DWG)	5962-8751425	(SEE DWG)
5962-8603201	68020-12	5962-8670604	27S37A	5962-8683901	54ALS244A	5962-8687517	(SEE DWG)	5962-8751426	(SEE DWG)
5962-8603202	68020-16	5962-8670701	2965	5962-8684001	54ALS191	5962-8687518	(SEE DWG)	5962-8751427	(SEE DWG)
5962-8603203	68020-20	5962-8670702	2966	5962-8684101	54ALS11A	5962-8687519	(SEE DWG)	5962-8751428	(SEE DWG)
5962-8604901	BUS-63105	5962-8670801	25LS399	5962-8684201	54ALS08	5962-8687520	(SEE DWG)	5962-8751501	(SEE DWG)
5962-8604902	BUS-63105II	5962-8670901	82S105	5962-8684301	54ALS04B	5962-8687521	(SEE DWG)	5962-8751502	(SEE DWG)
5962-8604903	ARX2402	5962-8670902	82S105	5962-8684401	54ALS02	5962-8687522	(SEE DWG)	5962-8751503	(SEE DWG)
5962-8604904	ARX3402	5962-8671001	54F381	5962-8684501	LT1016	5962-8687601	54LS668	5962-8751504	(SEE DWG)
5962-8604905	BUS-8553	5962-8671002	54F181	5962-8684601	72404L10	5962-8687701	LM111	5962-8751505	(SEE DWG)
5962-8604906	NHI-1509	5962-8671101	LM113	5962-8684602	72404L15	5962-8687801	TL514	5962-8751506	(SEE DWG)
5962-8604907	FC155361	5962-8671102	LM113-1	5962-8684603	72404L25	5962-8687901	HI-8382	5962-8751507	(SEE DWG)
5962-8605001	AM2932	5962-8671103	LM113-2	5962-8684604	72404L35	5962-8688001	HS3282	5962-8751508	(SEE DWG)
5962-8605101	27S02	5962-8671201	1545	5962-8684701	54HC123	5962-8688002	HI8282	5962-8751509	(SEE DWG)
5962-8605102	27S02A	5962-8671301	25LS2521	5962-8684702	54HC123A	5962-8688101	54LS382	5962-8751510	(SEE DWG)
5962-8605103	27LS02	5962-8671401	2917A	5962-8684801	54HC126	5962-8688201	(SEE DWG)	5962-8751511	(SEE DWG)
5962-8605104	27S03	5962-8671501	2918	5962-8684901	1549	5962-8688202	(SEE DWG)	5962-8751512	(SEE DWG)
5962-8605105	27S03A	5962-8671601	HI201HS	5962-8685001	54F194	5962-8688203	(SEE DWG)	5962-8751601	521
5962-8605106	27LS03	5962-8671602	DG271	5962-8685101	8X376	5962-8688301	54HCT08	5962-8751701	54LS590
5962-8605107	27S02-20	5962-8671603	ADG201HST	5962-8685201	54HCT32	5962-8688401	54HC238	5962-8751801	8259A
5962-8605108	27S03-20	5962-8671701	54LS595	5962-8685301	54HCT74	5962-8688501	54HC646	5962-8751901	9914A
5962-8605109	27LS03-30	5962-8671801	25S10	5962-8685401	54HCT161	5962-8688601	54HC4538	5962-8752001	8253
5962-8605201	8X350	5962-8671901	29LS18	5962-8685501	54HCT165	5962-8688701	OP-227A	5962-8752002	8253
5962-8605301	PAL22V10A	5962-8672001	26S10	5962-8685601	54HCT573	5962-8688801	55189	5962-8752003	8253-5
5962-8605302	PAL22V10	5962-8672101	26LS30	5962-8685701	54HCT688	5962-8688802	55189A	5962-8752101	54C922
5962-8605303	PAL22VP10-25	5962-8672201	5560	5962-8685901	(SEE DWG)	5962-8688901	55188	5962-8752201	9622
5962-8605304	PAL22V10-20	5962-8672301	2947	5962-8685902	(SEE DWG)	5962-8689001	54HCT14	5962-8752301	9636A
5962-8605305	PAL22V10-12	5962-8672302	2946	5962-8685903	(SEE DWG)	5962-8689101	54HC191	5962-8752401	9637A
5962-8605401	55551	5962-8672401	25S240	5962-8685904	(SEE DWG)	5962-8700101	10H536	5962-8752501	54ACT74
5962-8605402	55552	5962-8672501	25S241	5962-8685905	(SEE DWG)	5962-8700201	7132SA-45	5962-8752502	54ACT11074
5962-8605501	55553	5962-8672601	93S48	5962-8685906	(SEE DWG)	5962-8700202	7132SA-90	5962-8752601	Z0858110
5962-8605502	55554	5962-8672701	93S16	5962-8685907	(SEE DWG)	5962-8700203	7132SA-70	5962-8752602	Z0858106
5962-8605801	2803	5962-8672801	25S09	5962-8685908	(SEE DWG)	5962-8700204	7132SA-55	5962-8752701	Z0853006
5962-8606101	54HC157B	5962-8680101	2942	5962-8685909	(SEE DWG)	5962-8700205	7132LA-45	5962-8752702	Z0853004
5962-8606201	54HC563	5962-8680201	AD570	5962-8685910	(SEE DWG)	5962-8700206	7132LA-90	5962-8752801	PAL18P8A
5962-8606301	(SEE DWG)	5962-8680202	AD571	5962-8685911	(SEE DWG)	5962-8700207	7132LA-70	5962-8752802	PAL18P8B
5962-8606302	(SEE DWG)	5962-8680301	PAL20RA10	5962-8685912	(SEE DWG)	5962-8700208	7132LA-55	5962-8752803	PAL18P8AL
5962-8606303	(SEE DWG)	5962-8680401	PAL18L4	5962-8685913	(SEE DWG)	5962-8700209	7142SA-45	5962-8752804	PAL18P8L
5962-8606304	(SEE DWG)	5962-8680402	PAL12L10	5962-8685914	(SEE DWG)	5962-8700210	7142SA-90	5962-8752805	PAL18P8Q
5962-8606305	(SEE DWG)	5962-8680403	PAL14L8	5962-8685915	(SEE DWG)	5962-8700211	7142SA-70	5962-8752901	(SEE DWG)
5962-8606306	(SEE DWG)	5962-8680404	PAL16L6	5962-8685916	(SEE DWG)	5962-8700212	7142SA-55	5962-8752902	(SEE DWG)
5962-8606307	(SEE DWG)	5962-8680405	PAL20L2	5962-8685917	(SEE DWG)	5962-8700213	7142LA-45	5962-8753001	(SEE DWG)
5962-8606308	(SEE DWG)	5962-8680406	PAL20C1	5962-8685918	(SEE DWG)	5962-8700214	7142LA-90	5962-8753002	(SEE DWG)
5962-8606401	5539	5962-8680501	(SEE DWG)	5962-8685919	(SEE DWG)	5962-8700215	7142LA-70	5962-8753003	(SEE DWG)
5962-8606901	54F85	5962-8680502	(SEE DWG)	5962-8685920	(SEE DWG)	5962-8700216	7142LA-55	5962-8753004	(SEE DWG)
5962-8607001	54F148	5962-8680503	(SEE DWG)	5962-8685921	(SEE DWG)	5962-8700301	567	5962-8753101	(SEE DWG)
5962-8607101	54F164	5962-8680504	(SEE DWG)	5962-8685922	(SEE DWG)	5962-8750101	10H515	5962-8753102	(SEE DWG)
5962-8607201	54F169	5962-8680505	(SEE DWG)	5962-8685923	(SEE DWG)	5962-8750201	10H516	5962-8753103	(SEE DWG)
5962-8607401	54F322	5962-8680506	(SEE DWG)	5962-8685924	(SEE DWG)	5962-8750301	10H501	5962-8753201	2069
5962-8607501	54F350	5962-8680507	(SEE DWG)	5962-8686001	HA-4902	5962-8750401	10H504	5962-8753202	2070
5962-8607601	54HC163	5962-8680508	(SEE DWG)	5962-8686101	580S	5962-8750501	10H535	5962-8753301	54ALS857
5962-8607701	54HC280	5962-8680601	UC1846	5962-8686102	1503A	5962-8750601	10H574	5962-8753401	26S12
5962-8608101	2168-55	5962-8680602	1847	5962-8686103	580U	5962-8750701	10H505	5962-8753402	26S12A
5962-8608102	2168-70	5962-8680901	8797BH	5962-8686201	54FCT299	5962-8750801	10H525	5962-8753501	BUS-65112
5962-8608103	2169-50	5962-8681001	68562	5962-8686202	54FCT299A	5962-8750901	10H588	5962-8753502	2452
5962-8608104	2169-70	5962-8681101	68442-8	5962-8686301	29116	5962-8751001	10H589	5962-8753601	25S244
5962-8608105	2168-45	5962-8681201	54HC368	5962-8686401	(SEE DWG)	5962-8751101	10H541	5962-8753801	HS-1840RH
5962-8608106	2169-40	5962-8681301	54HC533	5962-8686501	54ALS10A	5962-8751201	10H576	5962-8753901	C22V10
5962-8608801	82720	5962-8681401	54HC534	5962-8686601	54ALS138	5962-8751301	(SEE DWG)	5962-8753902	C22V10
5962-8670101	54HCT154	5962-8681501	54HC564	5962-8686701	54HCT373	5962-8751302	(SEE DWG)	5962-8753903	C22V10
5962-8670201	25LS2519	5962-8681601	54HC595	5962-8686801	8286	5962-8751303	(SEE DWG)	5962-8753904	C22V10
5962-8670301	27S19	5962-8681701	54HC597	5962-8686802	8287	5962-8751304	(SEE DWG)	5962-8753905	C22V10
5962-8670302	27S19A	5962-8681801	54HC688	5962-8686901	54ALS157	5962-8751305	(SEE DWG)	5962-8753906	C22V10
5962-8670401	1842	5962-8681901	54HC4049	5962-8687001	54ALS164	5962-8751306	(SEE DWG)	5962-8754001	AD585
5962-8670402	1843	5962-8682001	54HC4050	5962-8687101	54ALS38A	5962-8751401	(SEE DWG)	5962-8754101	10H610
5962-8670403	1844	5962-8682101	54HC42	5962-8687201	54F38	5962-8751402	(SEE DWG)	5962-8754201	25LS2513
5962-8670404	1845	5962-8682201	54HC154	5962-8687301	7216L-40	5962-8751403	(SEE DWG)	5962-8754301	82S62
5962-8670405	1842A	5962-8682301	54HC158B	5962-8687302	7216L-55	5962-8751404	(SEE DWG)	5962-8754401	25LS2569
5962-8670406	1843A	5962-8682401	54HC160	5962-8687303	7216L-75	5962-8751405	(SEE DWG)	5962-8754501	760
5962-8670407	1844A	5962-8682501	54HC173	5962-8687304	7216L30	5962-8751406	(SEE DWG)	5962-8754601	9638
5962-8670408	1845A	5962-8682601	54HC194	5962-8687305	7216L25	5962-8751407	(SEE DWG)	5962-8754701	55110A
5962-8670501	(SEE DWG)	5962-8682701	54HC195	5962-8687306	7216L20	5962-8751408	(SEE DWG)	5962-8754702	55109A
5962-8670502	(SEE DWG)	5962-8682801	54HC366	5962-8687401	54F241	5962-8751409	(SEE DWG)	5962-8754801	8251A
5962-8670503	(SEE DWG)	5962-8683001	(SEE DWG)	5962-8687501	(SEE DWG)	5962-8751410	(SEE DWG)	5962-8754802	8251A

*Part numbers beginning with a slash "/" are MIL-M-38510 numbers. All others are DESC drawing numbers.

MILITARY PARTS
SORTED BY GENERIC MILITARY P/N

Military* P/N	Industry PN
5962-8754901	54AC00
5962-8754902	54AC11000
5962-8755001	54AC240
5962-8755002	54AC11240
5962-8755101	54AC241
5962-8755102	54AC11241
5962-8755201	54AC244
5962-8755202	54AC11244
5962-8755301	54ACT139
5962-8755401	54ACT138
5962-8755402	54ACT11138
5962-8755501	54AC373
5962-8755502	54AC11373
5962-8755601	54ACT373
5962-8755602	54ACT11373
5962-8755701	10H502
5962-8755801	10H513
5962-8755901	10H518
5962-8756001	10H524
5962-8756101	10H531
5962-8756201	10H560
5962-8756301	10H586
5962-8756401	10H506
5962-8756501	10H503
5962-8756601	10H558
5962-8756701	10H561
5962-8756801	10H571
5962-8756901	10H609
5962-8757001	8255A
5962-8757002	8255A-5
5962-8757101	AD590J
5962-8757102	AD590K
5962-8757103	AD590L
5962-8757104	AD590M
5962-8757201	527
5962-8757202	529
5962-8757203	LM161
5962-8757301	2930
5962-8757401	2964B
5962-8757501	9517A
5962-8757502	9517A-4
5962-8757601	8X371
5962-8757701	82C86H-5
5962-8757702	82C87H-5
5962-8757801	LT1007A
5962-8757901	BUS-63125
5962-8757902	BUS-63125II
5962-8757903	ARX2411
5962-8757904	ARX3411
5962-8757905	NHI-1500
5962-8757906	FC1553623
5962-8757907	CT1487D
5962-8757908	MR63125M
5962-8757909	FC1553621
5962-8759001	10H416
5962-8759101	AD7572
5962-8759102	AD7572
5962-8759103	AD7572
5962-8759104	AD7572
5962-8759105	AD7572
5962-8759106	AD7572
5962-8759201	9150-25
5962-8759202	9150-35
5962-8759203	9150-45
5962-8759301	8155
5962-8759302	8156
5962-8759401	LM185-1.2
5962-8759402	LM185-2.5
5962-8759403	LM185BX1.2
5962-8759404	LM185BX2.5
5962-8759405	LM185BY1.2
5962-8759406	LM185BY2.5
5962-8759501	54AS646
5962-8759601	26LS34
5962-8759701	9519A
5962-8759801	3183A
5962-8760001	TDC1048
5962-8760201	2960
5962-8760301	29C841
5962-8760302	29C843
5962-8760303	29C941
5962-8760304	29C943
5962-8760305	29C841A
5962-8760306	29C843A
5962-8760401	LM10
5962-8760501	LM104
5962-8760601	LM110
5962-8760701	LM131A
5962-8760801	198
5962-8760901	54AC04
5962-8760902	54AC11004
5962-8761001	54AC10
5962-8761002	54AC11010
5962-8761101	54AC11
5962-8761102	54AC11011
5962-8761201	54AC02
5962-8761202	54AC11002
5962-8761301	54AC20
5962-8761302	54AC11020
5962-8761401	54AC32
5962-8761501	54AC08
5962-8761502	54AC11008
5962-8761601	26LS32B
5962-8761701	0006
5962-8761702	0008
5962-8761801	HI524
5962-8761901	UC1707
5962-8762001	42106
5962-8762002	PA51
5962-8762101	54LS592
5962-8762201	54AC138
5962-8762301	54AC139
5962-8762401	54AC14
5962-8762501	54AC153
5962-8762601	54AC174
5962-8762701	54FCT377
5962-8762702	54FCT377A
5962-8762801	54FCT374
5962-8762802	54FCT374A
5962-8762901	54FCT245
5962-8762902	54FCT245A
5962-8763001	54FCT244
5962-8763002	54FCT244A
5962-8763101	54ACT374
5962-8763102	54ACT11374
5962-8763201	BUS-65111
5962-8763301	320C10
5962-8763302	320C10-25
5962-8763303	320CM10
5962-8763304	320CM10-25
5962-8763305	320CF10-25
5962-8763306	320E15
5962-8763307	320C15
5962-8763308	320C15-25
5962-8763501	670S
5962-8764001	UCS-5801
5962-8764002	UCS-5800
5962-8764101	UCS5822
5962-8764301	3517
5962-8764401	54FCT373
5962-8764402	54FCT373A
5962-8764501	1524B
5962-8764502	1524A
5962-8764601	14490A
5962-8764701	54HC03
5962-8764801	27C512
5962-8764802	27C512
5962-8764803	27C512
5962-8764804	27C512
5962-8764805	27C512
5962-8764901	(SEE DWG)
5962-8764902	(SEE DWG)
5962-8764903	(SEE DWG)
5962-8765001	(SEE DWG)
5962-8765002	(SEE DWG)
5962-8765003	(SEE DWG)
5962-8765004	(SEE DWG)
5962-8765005	(SEE DWG)
5962-8765101	(SEE DWG)
5962-8765301	ICM7170
5962-8765401	54FCT138
5962-8765402	54FCT138A
5962-8765501	54FCT240
5962-8765502	54FCT240A
5962-8765601	54FCT273
5962-8765602	54FCT273A
5962-8765701	1590
5962-8765801	TLC372
5962-8765901	TLC374
5962-8766001	ICL7667
5962-8766101	(SEE DWG)
5962-8766102	(SEE DWG)
5962-8766103	(SEE DWG)
5962-8766104	(SEE DWG)
5962-8766105	(SEE DWG)
5962-8766106	(SEE DWG)
5962-8766107	(SEE DWG)
5962-8766108	(SEE DWG)
5962-8766201	26S02
5962-8766301	54ACT245
5962-8766302	54ACT11245
5962-8766401	54ACT573
5962-8766501	1750A-15
5962-8766502	1750A-20
5962-8766503	1750A-30
5962-8766504	P1750A-40
5962-8766601	LT1080
5962-8766602	LT1081
5962-8766701	29C827
5962-8766702	29C828
5962-8766703	29C927
5962-8766704	29C928
5962-8766705	29C827A
5962-8766706	29C828A
5962-8766801	80386-16
5962-8766802	80386-12
5962-8766803	80386-20
5962-8766804	80386-25
5962-8766901	82384-16
5962-8766902	82384-12
5962-8767001	26LS29
5962-8767101	PAL20L8B
5962-8767102	PAL20R8B
5962-8767103	PAL20R6B
5962-8767104	PAL20R4B
5962-8767105	PLUS20L8
5962-8767106	PLUS20R8
5962-8767107	PAL20L8-15
5962-8767108	PAL20R8-15
5962-8767109	PAL20R6-15
5962-8767110	PAL20R4-15
5962-8767111	PAL20L8-12
5962-8767112	PAL20R8-12
5962-8767113	PAL20R6-12
5962-8767114	PAL20R4-12
5962-8767115	PAL20L8-10
5962-8767116	PAL20R8-10
5962-8767117	PAL20R6-10
5962-8767118	PAL20R4-10
5962-8767119	20R8-7
5962-8767201	82188
5962-8767301	DG180A
5962-8767401	LM160
5962-8767501	150
5962-8767502	150A
5962-8767601	MT4067-12
5962-8767602	MT4067-15
5962-8767603	MT4067-20
5962-8767604	MT4067-10
5962-8767701	HA-5330
5962-8767801	SP8690A
5962-8767901	4N55
5962-8767902	HCPL-5531
5962-8767903	HCPL-6531
5962-8768001	54HC4060
5962-8768101	1825
5962-8768201	82S153A
5962-8768301	54ALS139
5962-8768401	87C51
5962-8768402	87C51-16
5962-8768501	8088
5962-8768601	7217L-40
5962-8768602	7217L-55
5962-8768603	7217L-75
5962-8768701	HSDC-8920A
5962-8768702	HSDC-8920
5962-8768703	RDC14505-641
5962-8768801	MN3008
5962-8768802	MN3009
5962-8768901	DG528
5962-8769001	27S29
5962-8769002	27S29A
5962-8769101	54AC151
5962-8769201	54AC251
5962-8769301	54AC253
5962-8769401	54AC374
5962-8769501	54AC540
5962-8769701	54ACT377
5962-8769801	54ACT153
5962-8769901	54ACT00
5962-8769902	54ACT11000
5962-8770001	7524
5962-8770002	7524
5962-8770003	7524
5962-8770101	7528
5962-8770102	7528
5962-8770103	7528
5962-8770201	7545S
5962-8770202	7545T
5962-8770203	7545U
5962-8770204	7545G
5962-8770205	7545B
5962-8770206	7545A
5962-8770207	7545S
5962-8770301	(SEE DWG)
5962-8770302	(SEE DWG)
5962-8770303	(SEE DWG)
5962-8770401	29C861
5962-8770402	29C863
5962-8770403	29C961
5962-8770404	29C963
5962-8770405	29C861A
5962-8770406	29C863A
5962-8770501	68172
5962-8770601	OP-17A
5962-8770602	OP-17B
5962-8770701	2907
5962-8770801	29C10A
5962-8770802	39C10B
5962-8770803	39C10C
5962-8770804	7C910-51
5962-8770805	7C910-46
5962-8771001	LM158
5962-8771002	LM158A
5962-8771101	54221
5962-8771201	2004-25
5962-8771202	2004
5962-8771301	8274
5962-8771401	OP14A
5962-8771402	OP14B
5962-8771501	OP207
5962-8771601	MUX-08A
5962-8771602	MUX-08B
5962-8771701	MUX-16A
5962-8771702	MUX-16B
5962-8771801	MUX-24A
5962-8771802	MUX-24B
5962-8771901	AD625
5962-8772101	54HC125
5962-8772201	54HC4075
5962-8772301	54HC133
5962-8772401	54HC193
5962-8772501	54HCT273
5962-8772701	10H507
5962-8772801	10H519
5962-8772901	10H564
5962-8773001	10H521
5962-8773201	54HC76
5962-8773301	54HC4511
5962-8773401	82C284-10
5962-8773402	82C284-8
5962-8773403	82C284-6
5962-8773501	2100SG
5962-8773502	2100TG
5962-8773503	2100ASG
5962-8773504	2100ATG
5962-8773801	OP-77B
5962-8773802	OP-77A
5962-8773803	LT1001A
5962-8773901	LM139A
5962-8774001	1543
5962-8774002	1544
5962-8774101	LT1033
5962-8774201	1834
5962-8774301	12511
5962-8774401	(SEE DWG)
5962-8774402	(SEE DWG)
5962-8774801	12509
5962-8774901	12513
5962-8775001	10612
5962-8775101	12514
5962-8775201	12540
5962-8775301	14551B
5962-8775401	54HC4053
5962-8775501	29821A
5962-8775502	29823A
5962-8775503	29825A
5962-8775504	29921A
5962-8775505	29923A
5962-8775506	29925A
5962-8775601	54AC273
5962-8775701	54ACT174
5962-8775801	54AC245
5962-8775901	54ACT240
5962-8775902	54ACT11240
5962-8776001	54ACT244
5962-8776002	54ACT11244
5962-8776101	54ACT253
5962-8776201	7575S
5962-8776202	7575T
5962-8776301	7537S
5962-8776302	7537T
5962-8776303	7537U
5962-8776601	54AS804
5962-8776701	54AS760
5962-8776901	55121
5962-8777001	1532
5962-8777101	OP400A
5962-8777201	2952A
5962-8777202	2953A
5962-8777301	10598
5962-8777401	LM109
5962-8777501	LM123
5962-8777502	LT123AK
5962-8777601	7812A
5962-8777701	LM194
5962-8777801	LM195
5962-8778001	INA101
5962-8778002	INA101
5962-8778201	7805A
5962-8778301	HA-2400
5962-8778401	HA-5190
5962-8778402	EL-2190
5962-8778501	HA-2541
5962-8778502	EL-2041
5962-8778601	TDC1046
5962-8778701	HA-2539
5962-8778702	EL-2039
5962-8778801	27S21
5962-8778802	27S21A
5962-8778901	AD558S
5962-8778902	AD558T
5962-8779101	57401
5962-8779102	57402
5962-8779103	57401A
5962-8779104	57402A
5962-8779105	C57401
5962-8779106	C57402
5962-8779107	C57401A
5962-8779108	C57402A
5962-8779109	57L401D
5962-8779110	57L402D
5962-8779111	57L4013D
5962-8779201	10558
5962-8779301	10586
5962-8779401	54AS805
5962-8780101	AD567S
5962-8780201	7226
5962-8780301	MC4344
5962-8780401	54AS21
5962-8780501	54HC221
5962-8780502	54HC221A
5962-8780601	54HC299
5962-8780701	54HC377
5962-8780801	54HC192
5962-8780901	54HC640
5962-8850101	80C186-10
5962-8850102	80C186-12
5962-8850201	HA-5104
5962-8850301	TSC426
5962-8850302	TSC427
5962-8850303	TSC428
5962-8850304	TSC4423
5962-8850305	TSC4424
5962-8850306	TSC4425
5962-8850307	TSC4426
5962-8850308	TSC4427
5962-8850309	TSC4428
5962-8850401	PLS161
5962-8850402	PLS173
5962-8850501	AD573S
5962-8850502	AD673S
5962-8850601	68901-4
5962-8850602	68901-5
5962-8850701	PLS179

*Part numbers beginning with a slash "/" are MIL-M-38510 numbers. All others are DESC drawing numbers.

MILITARY PARTS
SORTED BY GENERIC MILITARY P/N

Military* P/N	Industry PN
5962-8850801	ADC-HX
5962-8850802	ADC-HZ
5962-8850901	AD390S
5962-8850902	AD390T
5962-8851001	AD394S
5962-8851002	AD394T
5962-8851003	AD395S
5962-8851004	AD395T
5962-8851101	55116
5962-8851102	55117
5962-8851103	55118
5962-8851104	55119
5962-8851301	OP-42A
5962-8851302	OP-42B
5962-8851401	HS9403-8
5962-8851402	HS9403-16
5962-8851403	HDAS-8
5962-8851404	HDAS-16
5962-8851501	(SEE DWG)
5962-8851502	(SEE DWG)
5962-8851503	(SEE DWG)
5962-8851504	(SEE DWG)
5962-8851601	29C821
5962-8851602	29C823
5962-8851603	29C921
5962-8851604	29C923
5962-8851605	AM29C821A
5962-8851606	AM29C823A
5962-8851701	DAC02310-112
5962-8851702	DAC02310-113
5962-8851801	(SEE DWG)
5962-8851802	(SEE DWG)
5962-8851803	(SEE DWG)
5962-8851901	UDS2981
5962-8851902	UDS2983
5962-8852001	54AC74
5962-8852002	54AC11074
5962-8852201	54AS808
5962-8852301	54AS832B
5962-8852501	(SEE DWG)
5962-8852502	(SEE DWG)
5962-8852503	(SEE DWG)
5962-8852504	(SEE DWG)
5962-8852505	(SEE DWG)
5962-8852506	(SEE DWG)
5962-8852507	(SEE DWG)
5962-8852508	(SEE DWG)
5962-8852509	(SEE DWG)
5962-8852510	(SEE DWG)
5962-8852511	(SEE DWG)
5962-8852512	(SEE DWG)
5962-8852513	(SEE DWG)
5962-8852514	(SEE DWG)
5962-8852515	(SEE DWG)
5962-8852516	(SEE DWG)
5962-8852701	10564
5962-8853201	TDC1049
5962-8853301	49C460A
5962-8853302	49C460B
5962-8853303	29C660A
5962-8853304	29C660B
5962-8853305	29C660C
5962-8853306	49C460C
5962-8853401	54ACT109
5962-8853402	54ACT11109
5962-8853501	7C901-32
5962-8853502	7C901-27
5962-8853701	OP-37A
5962-8853702	OP37B
5962-8853703	OP37C
5962-8853801	OP215A
5962-8853802	OP215B
5962-8853803	OP215BR
5962-8853901	AD524
5962-8854001	54ALS05A
5962-8854101	27S13A
5962-8854102	27S13
5962-8854201	ADC00300
5962-8854301	54FCT521
5962-8854302	54FCT521A
5962-8854303	54FCT521B
5962-8854401	(SEE DWG)
5962-8854402	(SEE DWG)
5962-8854403	(SEE DWG)
5962-8854404	(SEE DWG)
5962-8854501	(SEE DWG)
5962-8854502	(SEE DWG)
5962-8854503	(SEE DWG)
5962-8854504	(SEE DWG)
5962-8854601	54F676
5962-8854701	8087-2
5962-8854702	8087
5962-8854801	(SEE DWG)
5962-8854901	(SEE DWG)
5962-8854902	(SEE DWG)
5962-8855001	54F273
5962-8855101	UH503
5962-8855201	(SEE DWG)
5962-8855202	(SEE DWG)
5962-8855203	(SEE DWG)
5962-8855204	(SEE DWG)
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5962-8855208	(SEE DWG)
5962-8855209	(SEE DWG)
5962-8855301	7815A
5962-8855401	7824A
5962-8855501	54F378
5962-8855601	54HC4052
5962-8855701	10541
5962-8855901	OP421B
5962-8855902	OP421C
5962-8856001	10545
5962-8856101	LM199A
5962-8856102	LM199
5962-8856103	LM199A-20
5962-8856201	LT1010
5962-8856301	DAC703
5962-8856401	UH502
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5962-8868905	AM85C30-16
5962-8868906	AM85C30-8
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5962-8868909	Z8523016
5962-8868910	Z8523008
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5962-8870501	54ACT821
5962-8870601	54AC541
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5962-8870801	54F30
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5962-8871001	54F518
5962-8871101	54F519
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5962-8872301	54F09
5962-8872401	C22V10L-25
5962-8872402	C22V10L-30
5962-8872403	C22V10L-40

*Part numbers beginning with a slash "/" are MIL-M-38510 numbers. All others are DESC drawing numbers.

MILITARY PARTS
SORTED BY GENERIC MILITARY P/N

Military* P/N	Industry PN
5962-8872404	C22V10L
5962-8872501	(SEE DWG)
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5962-8872503	(SEE DWG)
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5962-8872505	(SEE DWG)
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5962-8872603	V750
5962-8872604	V750
5962-8872606	V750L
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5962-8953102	DAC-HPB-1
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5962-8953104	MN3291T/B-V
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5962-8956201	LT1054M
5962-8956301	MN5290
5962-8956302	MN5291
5962-8956401	604A
5962-8956501	HS362
5962-8956601	HS9716
5962-8956701	(SEE DWG)
5962-8956702	(SEE DWG)
5962-8956703	(SEE DWG)
5962-8956704	(SEE DWG)
5962-8956705	(SEE DWG)
5962-8956801	(SEE DWG)
5962-8956802	(SEE DWG)
5962-8956803	(SEE DWG)
5962-8956804	(SEE DWG)
5962-8956805	(SEE DWG)
5962-8956901	MN5295
5962-8957001	HCPL-5401
5962-8957101	HCPL-5431
5962-8957102	HCPL-6431
5962-8957201	HCPL-1931
5962-8957301	54F299
5962-8957401	54ALS165
5962-8957501	UT1760ARTS
5962-8957601	UT1553BRTR
5962-8957701	UT1553BBCRTM
5962-8958101	REF01A
5962-8958102	REF01
5962-8958201	54AC163
5962-8958301	MN5200
5962-8958302	MN5203
5962-8958303	MN5201
5962-8958304	MN5204
5962-8958305	MN5202
5962-8958306	MN5205
5962-8958307	MN5206
5962-8958401	MN5210
5962-8958402	MN5213
5962-8958403	MN5211
5962-8958404	MN5214
5962-8958405	MN5212
5962-8958406	MN5215
5962-8958407	MN5216
5962-8958601	LM1578
5962-8958602	LM1578A
5962-8958701	LM2940-5.0
5962-8958801	LM105
5962-8958901	LM107
5962-8959001	(SEE DWG)
5962-8959201	3231
5962-8959202	3232
5962-8959203	3231
5962-8959204	3232
5962-8959205	ARX3467
5962-8959206	ARX3464
5962-8959301	82380
5962-8959302	82380
5962-8959401	CLC231A
5962-8959501	MN5245
5962-8959502	MN5245A
5962-8959503	MN5246
5962-8959504	MN5246A
5962-8959601	8097BH
5962-8959801	(SEE DWG)
5962-8959802	(SEE DWG)
5962-8959803	(SEE DWG)
5962-8959804	(SEE DWG)
5962-8959805	(SEE DWG)
5962-8959806	(SEE DWG)
5962-8959807	(SEE DWG)
5962-8959808	(SEE DWG)
5962-8959809	(SEE DWG)
5962-8959810	(SEE DWG)
5962-8959811	(SEE DWG)
5962-8959812	(SEE DWG)
5962-8959813	(SEE DWG)
5962-8959814	(SEE DWG)
5962-8959815	(SEE DWG)
5962-8959816	(SEE DWG)
5962-8959817	(SEE DWG)
5962-8959818	(SEE DWG)
5962-8959819	(SEE DWG)
5962-8959820	(SEE DWG)
5962-8959821	(SEE DWG)
5962-8959822	(SEE DWG)
5962-8959823	(SEE DWG)
5962-8959824	(SEE DWG)
5962-8959825	(SEE DWG)
5962-8959826	(SEE DWG)
5962-8959827	(SEE DWG)
5962-8959828	(SEE DWG)
5962-8959829	(SEE DWG)
5962-8959830	(SEE DWG)
5962-8959831	(SEE DWG)
5962-8959832	(SEE DWG)
5962-8959833	(SEE DWG)
5962-8959834	(SEE DWG)
5962-8959835	(SEE DWG)
5962-8959836	(SEE DWG)
5962-8959837	(SEE DWG)
5962-8959838	(SEE DWG)
5962-8959901	54ACT251
5962-8960101	54ACT574
5962-8960201	54ALS541
5962-8960301	54HC590
5962-8960401	UH-432
5962-8960402	UH-432-1
5962-8960403	UH-532
5962-8960901	54HC4046A
5962-8961001	LT1009
5962-8961101	UC1706
5962-8961401	(SEE DWG)
5962-8961402	(SEE DWG)
5962-8961403	(SEE DWG)
5962-8961404	(SEE DWG)
5962-8961405	(SEE DWG)
5962-8961406	(SEE DWG)
5962-8961407	(SEE DWG)
5962-8961408	(SEE DWG)
5962-8961409	(SEE DWG)
5962-8961501	DS16F95
5962-8961601	ADC-908A
5962-8961602	ADC-908B
5962-8961603	PM-7574A
5962-8961604	PM-7574B
5962-8961701	AD767
5962-8962001	EL2020
5962-8962101	LM6161
5962-8962201	LT1022A
5962-8962202	LT1022
5962-8962301	EL2003
5962-8962302	EL2033
5962-8962401	LM6164
5962-8962501	LM6165
5962-8962601	7806A
5962-8962701	HA-5127
5962-8962702	HA-5137
5962-8962703	HA-5147
5962-8962801	7808A
5962-8962901	AD7569S
5962-8962902	AD7569T
5962-8963001	78C120
5962-8963101	HA-5111
5962-8963201	HA-5112
5962-8963301	HA-5033
5962-8963401	HA-5114
5962-8963501	HA-5101

*Part numbers beginning with a slash "/" are MIL-M-38510 numbers. All others are DESC drawing numbers.

MILITARY PARTS
SORTED BY GENERIC MILITARY P/N

Military* P/N	Industry PN
5962-8963601	HA-5002
5962-8963701	AD637
5962-8963801	TSC170
5962-8963802	TSC171
5962-8963901	LM604
5962-8964001	AD840
5962-8964101	AD841
5962-8964201	AD842
5962-8964301	HA-2542
5962-8964401	AD844
5962-8964501	AD845
5962-8964601	AD846
5962-8964701	AD847S
5962-8964801	HA-2540
5962-8964802	EL-2040
5962-8965201	54FCT399
5962-8965202	54FCT399A
5962-8965301	BT102
5962-8965401	AD9012S
5962-8965402	AD9012T
5962-8965501	AD7672TQ10
5962-8965502	AD7672UQ10
5962-8965503	AD7672TQ05
5962-8965504	AD7672UQ05
5962-8965601	HA-5141
5962-8965602	HA-5142
5962-8965603	HA-5144
5962-8965701	7547S
5962-8965702	7547T
5962-8965703	7547U
5962-8965801	54ACT534
5962-8965802	54ACT11534
5962-8965901	EL2004
5962-8966101	(SEE DWG)
5962-8966102	(SEE DWG)
5962-8966301	54AS286
5962-8966401	(SEE DWG)
5962-8966402	(SEE DWG)
5962-8966501	54FCT824A
5962-8966502	54FCT824B
5962-8966601	(SEE DWG)
5962-8966602	(SEE DWG)
5962-8966603	(SEE DWG)
5962-8966604	(SEE DWG)
5962-8966605	(SEE DWG)
5962-8966606	(SEE DWG)
5962-8966701	(SEE DWG)
5962-8966801	54AS867
5962-8966901	SW-06B
5962-8967001	OP490A
5962-8967101	DAC8221A
5962-8967201	DAC8222A
5962-8967301	OP-50A
5962-8967302	OP-50B
5962-8967401	CS5014-S
5962-8967402	CS5014-T
5962-8967601	CS5016-S
5962-8967602	CS5016-T
5962-8967701	LT1014A
5962-8967702	LT1014
5962-8967801	DAC-8408A
5962-8967802	DAC-8408B
5962-8967901	CS5012
5962-8968001	55ALS160
5962-8968101	55ALS161
5962-8968201	54AC646
5962-8968301	(SEE DWG)
5962-8968302	(SEE DWG)
5962-8968303	(SEE DWG)
5962-8968401	2821
5962-8968501	2823
5962-8968601	2824
5962-8968701	54ALS653
5962-8968801	54ACT157
5962-8968901	54ACT257
5962-8969001	(SEE DWG)
5962-8969002	(SEE DWG)
5962-8969101	(SEE DWG)
5962-8969102	(SEE DWG)
5962-8969104	(SEE DWG)
5962-8969106	(SEE DWG)
5962-8969201	(SEE DWG)
5962-8969202	(SEE DWG)
5962-8969203	(SEE DWG)
5962-8969204	(SEE DWG)
5962-8969205	(SEE DWG)
5962-8969206	(SEE DWG)
5962-8969301	54ACT175
5962-8969401	7C190
5962-8969501	54HC113
5962-8969601	(SEE DWG)
5962-8969602	(SEE DWG)
5962-8969603	(SEE DWG)
5962-8969604	(SEE DWG)
5962-8969605	(SEE DWG)
5962-8969606	(SEE DWG)
5962-8969701	AD7846
5962-8969801	AD7579
5962-8969802	AD7580
5962-8970001	54HCT123
5962-8970101	54HCT175
5962-8970201	54HCT112
5962-8970301	54HCT27
5962-8970401	54HCT164
5962-8970501	54HCT257
5962-8970701	54HCT162
5962-8970801	54HCT258
5962-8970901	54HCT11
5962-8971001	ADG526A
5962-8971002	ADG527A
5962-8971101	TMC2023V
5962-8971102	TMC2023V1
5962-8971103	TMC2023V2
5962-8971104	TMC2023V3
5962-8971201	(SEE DWG)
5962-8971202	(SEE DWG)
5962-8971203	(SEE DWG)
5962-8971204	(SEE DWG)
5962-8971301	3042
5962-8971302	3042
5962-8971303	3042-100
5962-8971304	3042-125
5962-8971501	TMC2301
5962-8971502	TMC2301
5962-8971601	LPR520
5962-8971602	LPR520
5962-8971603	LPR520
5962-8971604	LPR521
5962-8971605	LPR521
5962-8971606	LPR521
5962-8971701	LSH32
5962-8971702	LSH32
5962-8971801	MN3020
5962-8972101	HA-2529
5962-8972201	54F30245
5962-8972301	54F259
5962-8972401	54F574
5962-8972501	82510
5962-8972601	80C451
5962-8972602	83C451
5962-8972801	AD588S
5962-8972802	AD588T
5962-8972901	54AC158
5962-8973001	54FCT543
5962-8973002	54FCT543A
5962-8973101	54FCT833A
5962-8973102	54FCT833B
5962-8973201	54FCT241
5962-8973202	54FCT241A
5962-8973301	54FCT191
5962-8973302	54FCT191A
5962-8973303	54FCT191
5962-8973304	54FCT191A
5962-8973401	54ACT04
5962-8973402	54ACT11004
5962-8973501	54ACT273
5962-8973601	54ACT32
5962-8973602	54ACT11032
5962-8974001	54HCT640
5962-8974101	54HCT597
5962-8974201	54HCT574
5962-8974301	54HCT174
5962-8974501	54HCT238
5962-8974601	54HCT30
5962-8974701	54HCT04
5962-8974801	54LS642
5962-8974901	54AC191
5962-8975101	54HCT02
5962-8975401	54F646
5962-8975402	54F648
5962-8975501	C22V10L
5962-8975502	C22V10L
5962-8975503	C22V10L
5962-8975504	C22V10L
5962-8975601	54LS598
5962-8975701	54AS885
5962-8975801	54FCT843A
5962-8975802	54FCT843B
5962-8975803	54FCT843C
5962-8976301	DG403
5962-8976401	(SEE DWG)
5962-8976402	(SEE DWG)
5962-8976403	(SEE DWG)
5962-8976404	(SEE DWG)
5962-8976405	(SEE DWG)
5962-8976406	(SEE DWG)
5962-8976407	(SEE DWG)
5962-8976408	(SEE DWG)
5962-8976501	54HC283
5962-8976601	54FCT541
5962-8976602	54FCT541A
5962-8976701	54FCT540
5962-8976702	54FCT540A
5962-8976901	54HCT377
5962-8977101	54HCT4060
5962-8977201	8397BH
5962-8977501	EN2015
5962-8977502	EN2015A
5962-8977601	EN2016
5962-8977602	EN2016A
5962-8977701	7684T
5962-8977702	7684S
5962-8977703	MP7684AT
5962-8977704	MP7684AS
5962-8977705	7690AT
5962-8977706	7690AS
5962-8977801	1648M
5962-8978001	3523
5962-8978201	LTC1052
5962-8978301	OP-290
5962-8978501	HCPL-5731
5962-8978502	HCPL-6731
5962-8978701	9627
5962-8979001	(SEE DWG)
5962-8979002	(SEE DWG)
5962-8979003	(SEE DWG)
5962-8979004	(SEE DWG)
5962-8979301	54ACT520
5962-8979302	54ACT521
5962-8979303	54ACT11520
5962-8979304	54ACT11521
5962-8979801	BUS-65142
5962-8979802	BUS-65143
5962-8979901	FC155391
5962-8979902	FC155392
5962-8980101	OP-11A
5962-8980102	OP-11B
5962-8980201	LT1031B
5962-8980202	LT1031C
5962-8980203	LT1031D
5962-8980301	SL523AC
5962-8980401	OP44A
5962-8980701	AD630
5962-8980801	AD568SQ
5962-8980802	AD568SE
5962-8980901	AD539
5962-8981001	HCPL-5701
5962-8981301	1437
5962-8981501	(SEE DWG)
5962-8981502	(SEE DWG)
5962-8981503	(SEE DWG)
5962-8981701	(SEE DWG)
5962-8981702	(SEE DWG)
5962-8981703	(SEE DWG)
5962-8981704	(SEE DWG)
5962-8981705	(SEE DWG)
5962-8981706	(SEE DWG)
5962-8982101	DS1634
5962-8982301	3090-50
5962-8982302	3090-70
5962-8982303	3090-100
5962-8982304	3090-125
5962-8982401	AD586S
5962-8982402	AD586T
5962-8982501	AD587SQ
5962-8982502	AD587TQ
5962-8982503	AD587UQ
5962-8982601	BUS-63127II
5962-8982602	ARX3419
5962-8982603	NHI-1502
5962-8982604	NHI-1523
5962-8982605	FC1553721
5962-8982606	CT1589D
5962-8982801	TDC1044
5962-8983001	LTC1090
5962-8983002	LTC1290B
5962-8983003	LTC1290C
5962-8983004	LTC1290D
5962-8983901	16V8A
5962-8983902	16V8A
5962-8983903	16V8A
5962-8983904	16V8
5962-8983905	16V8
5962-8983906	16V8
5962-8984001	20V8
5962-8984002	20V8
5962-8984003	20V8
5962-8984101	22V10
5962-8984102	22V10
5962-8984103	22V10
5962-8984104	22V10
5962-8984105	22V10
5962-8984106	22V10
5962-8984201	ICL8211
5962-8984202	ICL8212
5962-8984301	54HCT10
5962-8984401	54HCT86
5962-8984501	54HCT132
5962-8984502	54HC132
5962-8984701	54ACT241
5962-8984702	54ACT11241
5962-8984901	54HCT534
5962-8985201	54HCT259
5962-8985501	CY7C331-40
5962-8985502	CY7C331-30
5962-8985503	CY7C331-25
5962-8985601	10H509
5962-8985701	54F367
5962-8985801	CLC206A
5962-8986201	HS9378TB
5962-8986202	HS9378SB
5962-8986301	(SEE DWG)
5962-8986302	(SEE DWG)
5962-8986303	(SEE DWG)
5962-8986304	(SEE DWG)
5962-8986305	(SEE DWG)
5962-8986306	(SEE DWG)
5962-8986701	UH-507
5962-8987001	7908A
5962-8987101	CMP-01
5962-8987301	LT1003
5962-8987601	2023
5962-8987701	(SEE DWG)
5962-8988001	HA-2522
5962-8988002	HA-2520
5962-8988201	78C30
5962-8988301	(SEE DWG)
5962-8988302	(SEE DWG)
5962-8988303	(SEE DWG)
5962-8988901	54ALS870
5962-8989001	54HCT393
5962-8989101	(SEE DWG)
5962-8989102	(SEE DWG)
5962-8989103	(SEE DWG)
5962-8989104	(SEE DWG)
5962-8989105	(SEE DWG)
5962-8989106	(SEE DWG)
5962-8989201	(SEE DWG)
5962-8989202	(SEE DWG)
5962-8989203	(SEE DWG)
5962-8989204	(SEE DWG)
5962-8989205	(SEE DWG)
5962-8989206	(SEE DWG)
5962-8989601	OP90A
5962-8989701	LT1058A
5962-8989702	LT1058
5962-8989901	UC1838A
5962-8990401	CMP404A
5962-8990402	CMP404B
5962-8990403	CMP04B
5962-8990501	1823
5962-8990801	SDC14565-114
5962-8990802	SDC14565-115
5962-8990803	SDC14565-616
5962-8990804	SDC14566-115
5962-8990805	SDC14565-618
5962-8990806	HRD1066-341H
5962-8990807	HRD1066-341V
5962-8990808	HRD1066-381H
5962-8991001	CLC200A
5962-8991101	CLC220A
5962-8991501	7818A
5962-8992001	UC1840
5962-8992002	UC1841
5962-8992101	LM129A
5962-8992102	LM129B
5962-8992103	LM129C
5962-8992501	54LS378
5962-8992801	BT458
5962-8993201	DAC08
5962-8993501	7C192
5962-8993502	7C192
5962-8993503	7C192
5962-8994001	AD346
5962-8994002	MN346
5962-8994201	(SEE DWG)
5962-8994202	(SEE DWG)
5962-8994203	(SEE DWG)
5962-8994204	(SEE DWG)
5962-8994205	(SEE DWG)
5962-8994301	(SEE DWG)
5962-8994302	(SEE DWG)
5962-8994303	(SEE DWG)
5962-8994304	(SEE DWG)
5962-8994401	54LS248
5962-8994501	54ALS996
5962-8994601	54HC190
5962-8994701	54HCT4040
5962-8994801	3020
5962-8994802	3020
5962-8994803	3020-100
5962-8934804	3020-125
5962-8995001	54ACT112
5962-8995101	(SEE DWG)
5962-8995102	(SEE DWG)
5962-8995103	(SEE DWG)
5962-8995301	54HC4015
5962-8995401	54HC4520
5962-8995601	54ALS646
5962-8995701	UC1637
5962-8995901	L4C381-45
5962-8996101	DG405
5962-8996701	(SEE DWG)
5962-8996702	(SEE DWG)
5962-8996703	(SEE DWG)
5962-8996704	(SEE DWG)
5962-8996901	35074
5962-8996902	35074A
5962-8997001	400
5962-8997101	8744H-10
5962-8997301	CLC401
5962-8997302	EL2171
5962-8997401	CLC501
5962-8997501	CLC110
5962-8997502	EL2072
5962-8997601	LT1055A
5962-8997602	LT1056A
5962-8997603	LT1055
5962-8997604	LT1056
5962-8997901	SP1078B
5962-8998101	(SEE DWG)
5962-8998201	80C196KB
5962-8998601	DSC11520-112
5962-8998602	DSC11520-113
5962-8998603	DSC11520-114
5962-8998604	DSC11520-115
5962-8998901	54HC623
5962-8999001	54HC297
5962-9050201	54F198
5962-9050301	54LS396
5962-9050401	L64230-12
5962-9050402	L64230-16
5962-9050501	54HCT153
5962-9050601	54F623
5962-9050602	54F621
5962-9050801	AD9002S
5962-9050802	AD9002T
5962-9050901	EL2002A
5962-9050902	EL2002
5962-9051001	68HC11A0
5962-9051002	68HC11A1
5962-9051201	8748H
5962-9051301	AM29833A
5962-9051302	AM29853A
5962-9051303	AM29855A

*Part numbers beginning with a slash "/" are MIL-M-38510 numbers. All others are DESC drawing numbers.

MILITARY PARTS
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Military* P/N	Industry PN
5962-9051401	54BCT245
5962-9051501	AM29C818
5962-9051601	54BCT374
5962-9051801	HD-4702
5962-9051901	LT1029A
5962-9051902	LT1029
5962-9052001	SL560AC
5962-9052101	SL532
5962-9052201	DS1632
5962-9052301	54ALS648
5962-9052401	54HCT251
5962-9052501	HD-6402R
5962-9052502	HD-6402B
5962-9052601	320C30
5962-9052602	320C30
5962-9052603	320C30
5962-9052701	7968-125V
5962-9052801	7969-125V
5962-9053501	OP64A
5962-9053601	OP-260A
5962-9053801	UC1611
5962-9054101	54LS183
5962-9054301	82C37A-5
5962-9054302	82C37A
5962-9054303	82C37A-12
5962-9054304	82C237
5962-9054305	82C237-12
5962-9054401	HCP16003
5962-9054402	HPC16083
5962-9054501	LTC1045
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5962-9093003	7C269
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5962-9093801	54BCT760
5962-9093901	54BCT2240
5962-9094001	54BCT623
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5962-9094603	80960MC-25
5962-9094604	80960XA-16
5962-9094605	80960XA-20
5962-9094606	80960XA-25
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5962-9099401	CLC404
5962-9099501	CLC925B
5962-9099601	TMC2009
5962-9099602	LMA1009/2009
5962-9099603	LMA1009/2009

*Part numbers beginning with a slash "/" are MIL-M-38510 numbers. All others are DESC drawing numbers.

MILITARY PARTS
SORTED BY GENERIC MILITARY P/N

Military* P/N	Industry PN
5962-9099604	LMA1009/2009
5962-9099701	M82C288-6
5962-9099702	M82C288-8
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5962-9151802	10E474L
5962-9151901	OP249A
5962-9152101	AD7874
5962-9152801	100301
5962-9152802	100302
5962-9152901	54AS874
5962-9153001	100324
5962-9153101	100325
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5962-9153401	EL2001A
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5962-9153501	EL2038
5962-9153601	100331
5962-9153701	100304
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5962-9154503	V2500L
5962-9154601	V2500H
5962-9154602	V2500H
5962-9154603	V2500H
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5962-9155902	HDSR2056P34V
5962-9155903	HDSR2056P34H
5962-9155904	HDSR2056P34S
5962-9156001	HSD1046341V2
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5962-9156003	HSD1046341S2
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5962-9157902	ATW2805S/CHS
5962-9157903	ATW2805S/CHM
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5962-9160401	54AC258
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5962-9160601	54AC821
5962-9160701	54ACT323
5962-9160901	54ACT818
5962-9161001	54ACT823
5962-9161101	54ACT825
5962-9161301	ATW2815D/CH
5962-9161302	ATW2815D/CHS
5962-9161303	ATW2815D/CHM
5962-9161401	MHF+2815D
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5962-9174904	BUS63104II
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5962-9176403	DAC8413A
5962-9176404	DAC8413B
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5962-9200301	SP8630
5962-9200401	CLC406
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5962-9201001	VIC068A
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5962-9202201	54ACT16244
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5962-9203001	CLC430
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5962-9203301	CLC402
5962-9203401	CLC409
5962-9204001	AHE2812D/CH
5962-9204002	AHE2812D/CHS
5962-9204003	AHE2812D/CHM
5962-9204101	DG441A
5962-9204102	DG442A
5962-9204201	DG408
5962-9204202	DG409
5962-9204601	54LS628
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5962-9207807	WS512K8-35CQ
5962-9207808	WS512K8-25CQ
5962-9208401	SL531
5962-9208501	NHI-1551
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5962-9208503	ARX-4418
5962-9208504	NHI-1515
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5962-9209001	54F827
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5962-9209302	LPC660
5962-9209303	LMC6064
5962-9209401	LMC662
5962-9209402	LPC662
5962-9209403	LMC6062
5962-9209701	43891GM-20
5962-9209702	43891GM-25
5962-9210101	(SEE DWG)
5962-9210102	(SEE DWG)
5962-9210103	(SEE DWG)
5962-9210301	FLP
5962-9210401	AP1
5962-9210501	(SEE DWG)
5962-9210502	(SEE DWG)
5962-9210601	AP2
5962-9210901	ATS2812D/CH
5962-9210902	ATW2812D/CHS
5962-9210903	ATW2812D/CHM
5962-9211101	AHF2812D/CH
5962-9211501	AHV2812TF/CH
5962-9211601	AHV2815TF/CH
5962-9211701	AD827
5962-9211801	UT69151
5962-9212101	20RA10
5962-9212102	20RA10
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5962-9212601	MAX663
5962-9212602	MAX664
5962-9212603	MAX666
5962-9212701	MAX638A
5962-9212702	MAX638B
5962-9212801	EL2019
5962-9212901	5212A
5962-9213801	HSRD1006-341
5962-9213802	HSRD1006-341
5962-9213803	HSRD1006-341
5962-9213804	HSRD1006-341
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5962-9214003	27C2048
5962-9214101	MAX631A
5962-9214102	MAX631B
5962-9214103	MAX632A
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5962-9214105	MAX633A
5962-9214106	MAX633B
5962-9214401	MHF+2812D
5962-9214701	54ABT244
5962-9215301	(SEE DWG)
5962-9215501	(SEE DWG)
5962-9215502	(SEE DWG)
5962-9215601	1280
5962-9215602	1280-1
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5962-9215702	49FCT805A
5962-9215703	49FCT806
5962-9215704	49FCT806A
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5962-9216201	BUS-65153
5962-9216202	BUS-65154
5962-9216501	LM6162
5962-9216601	LM1577-ADJ
5962-9216701	LM1577-12
5962-9216801	LM1577-15
5962-9217201	7B162
5962-9217202	7B162
5962-9217203	7B162
5962-9217601	54ACQ244
5962-9218101	54ACTQ02

*Part numbers beginning with a slash "/" are MIL-M-38510 numbers. All others are DESC drawing numbers.

MILITARY PARTS
SORTED BY GENERIC MILITARY P/N

Military* P/N	Industry PN
5962-9218201	54ACTQ10
5962-9218301	54ACTQ14
5962-9218401	54ACTQ240
5962-9218601	54ACTQ244
5962-9218701	54ACTQ245
5962-9218801	54ACTQ373
5962-9219001	54ACTQ377
5962-9219701	54ACTQ657
5962-9220001	54ACTQ841
5962-9220101	54AC280
5962-9220301	54FCT244T
5962-9220302	54FCT244AT
5962-9220303	54FCT244CT
5962-9220304	54FCT244T
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5962-9220306	54FCT244CT
5962-9220501	29FCT520AT
5962-9220502	29FCT520AT
5962-9220503	29FCT520BT
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5962-9220505	29FCT520CT
5962-9220506	29FCT520CT
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5962-9220803	54FCT157AT
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5962-9220901	54FCT161T
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5962-9220903	54FCT161AT
5962-9220904	54FCT161AT
5962-9220905	54FCT161CT
5962-9220906	54FCT161CT
5962-9221101	54FCT257T
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5962-9221103	54FCT257AT
5962-9221104	54FCT257AT
5962-9221105	54FCT257CT
5962-9221106	54FCT257CT
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5962-9313901	MIC5011
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5962-9315602	WS-128K8-100
5962-9315603	WS-128K8-85C
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5962-9316605	(SEE DWG)
5962-9316606	(SEE DWG)
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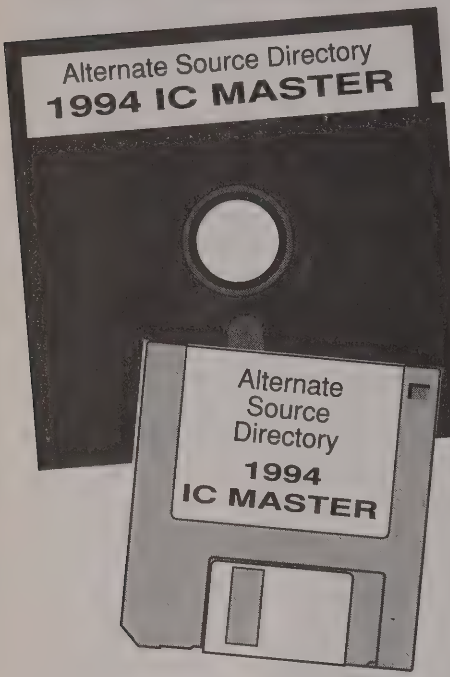

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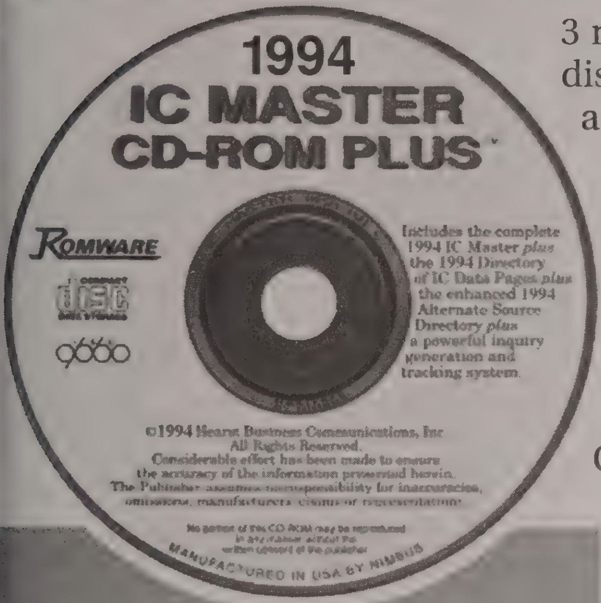
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ACT™ Family Chart

	Device	A1010B			A1020B			A1225A			A1240A			A1280A			A1415A		A1425 A1425A		A1440A		A1460A		A14100A	
	Speed Grades	Std	-1	-2	Std	-1	-2	Std	-1	-2	Std	-1	-2	Std	-1	-2	Std	-1	Std	-1	Std	-1	Std	-1	Std	-1
	Gate Array Gates	1,200			2,000			2,500			4,000			8,000			1,500		2,500		4,000		6000		10,000	
	PREP Capacity	TBD			TBD			10.4			16.1			28.7			4.1*		6.8		10.8*		16.3*		27.1*	
Equiv. Packages	TTLs	30			50			60			100			200			40		60		100		150		250	
	20-pin PALs	12			20			25			40			80			15		25		40		60		100	
	Logic Modules	295			546			431			684			1,232			200		310		564		848		1,377	
Flip-Flops	Dedicated	0			0			231			348			624			264		360		568		768		1,153	
	Max.	147			273			382			568			998			312		435		706		976		1,493	
	User I/O	57			69			83			104			140			80		100		140		168		228	
	CMOS Process	1.0µm			1.0µm			1.0µm			1.0µm			1.0µm			0.8µm		0.8µm		0.8µ		0.8µ		0.8µ	
	Max .Clock (in MHz)	48	57	65	48	57	65	110	120	130	90	110	125	75	90	105	125	150	125	150	125	150	100	120	100	120
PREP Mean Internal Performance (in MHz)	System	TBD	TBD	TBD	TBD	TBD	TBD	38	45	50*	36	42	48	29	35	45*	59*	69*	59	69*	59*	69*	55*	65*	55*	65*
	16-bit Load Counters	TBD	TBD	TBD	TBD	TBD	TBD	43	51	60*	44	52	58	35	41	51*	70*	82*	70	82*	70*	82*	68*	80*	68*	80*
	16-bit Accumulators	TBD	TBD	TBD	TBD	TBD	TBD	27	32	38*	27	32	36	24	28	36*	40*	47*	40	47*	40*	47*	40*	47*	40*	47*
	Datapath	TBD	TBD	TBD	TBD	TBD	TBD	75	90	105*	66	80	100	50	75	85*	125*	150*	125	150*	125*	150*	100*	120*	100*	120*

PREP Capacity is calculated by averaging the number of repetitions of the nine PREP benchmarks. ACT 3 I/O register capacity is not included in these PREP benchmarks. System performance is calculated by averaging the mean internal performance of the nine benchmarks.

ACT Package and Testing Options

Device		A1010B			A1020B			A1225A			A1240A			A1280A			A1415A		A1425 A1425A		A1440A		A1460A		A14100A	
Speed Grades		Std	-1	-2	Std	-1	-2	Std	-1	-2	Std	-1	-2	Std	-1	-2	Std	-1	Std	-1	Std	-1	Std	-1	Std	-1
Package Type PLCC	44	X	X	X	X	X	X																			
	68	X	X	X	X	X	X																			
	84				X	X	X	X	X	X	X	X	X				P	P	X	X						
PFPQ	100	X	X	X	X	X	X	X	X	X							P	P	X	X						
	144										X	X	X													
	160													X	X	X			X	X	P	P				
	208																						X	X		
VQFP	80	X	X	X	X	X	X																			
CQFP	84				X	X	X																			
	172													X	X	X										
CPGA	84	X	X	X	X	X	X																			
	100							X	X	X							P	P								
	132										X	X	X													
	133																		X	X						
	175																				P	P				
	176													X	X	X										
	207																						X	X		
	256																								P	P
Temperature and Qualification Levels	Comm Temp	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	P	P	X	X	P	P	X	X	P	P
	Ind Temp	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	P	P	X	X	P	P	X	X		
	Mil Temp	X	X		X	X					X	X		X	X				X							
	883 Qual	X	X		X	X					X	X		X	X				P				P		P	
	Extended Testing				X									X									P		P	

PLCC= Plastic J-leaded Chip Carrier; PQFP= Plastic Quad Flatpack; VQFP= Very Thin (1.0mm) Plastic Quad Flatpack; CQFP= Ceramic Quad Flatpack; CPGA= Ceramic Pin Grid Array; P= Pending, X= Available Today.

Actel

Actel Corporation
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Sunnyvale, CA 94086
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Actel's CAE software, including Designer for Windows, provides full design capabilities including 100% automatic place and routing and a guaranteed gate utilization of 85%. With Actel FPGAs you don't waste valuable engineering time or speed/logic capacity. It's the right device for your application.

PREP

Presentations use or include the most recent uncertified (*) PREP PLD Benchmark data which was measured according to Benchmark Suite #1, Version 1.2, dated 3-28-93. Any analysis is not endorsed by PREP.

Actel

American Microsystems, Inc.
2300 Buckskin Road, Pocatello, Idaho 83201 • (208) 233-4690
Fax: (208) 234-6795 or 234-6796

Digital ASICs

The AMI Digital ASIC product portfolio includes both Gate Array and Standard Cell 0.8-micron and 1.0-micron devices. The 0.8-micron Gate Arrays (AMI8GX) and the 0.8 -micron Standard Cells (AMI8S) are among the fastest ASICs available today (see spec below).

Gate Arrays

AMI's series of 0.8-micron and 1.0-micron gate arrays exploit a proprietary power grid and track routing architecture on a compact, channelless, sea-of-gates design to provide one of the highest performance, cost effective array products available today.

AMI offers gate array in 0.8-micron (AMI8GX series) triple or double metal CMOS processes. The 0.8-micron gate array useable gates range from 2,630 to 464,350 (see attached table).

Standard Cells

AMI's "AMI8S" standard cell family continues the AMI leadership tradition of combing true compact building block standard cells and megacells with high speed memory and datapath functions. Using the 0.8-micron high performance CMOS process, the AMI8S product can offer a lower cost alternative to gate array for high volume applications.

AMI8GX Gate Array Family

Part Number	Raw Gates	Usable		Available I/O Cells	Available Bond Pads[2]
		Triple Metal	Double Metal		
AMI8G663	663,350	464,350	331,700	732	528
AMI8G392	392,160	274,500	196,100	564	424
AMI8G247	246,790	172,750	123,400	448	336
AMI8G201	200,740	140,500	100,400	404	304
AMI8G142	141,590	99,100	70,800	340	256
AMI8G93	92,740	64,900	46,400	276	208
AMI8G65	65,420	45,800	32,700	232	176
AMI8G55	54,700	38,300	27,400	212	160
AMI8G44	44,460	31,100	22,200	192	144
AMI8G34	33,860	23,700	16,900	168	128
AMI8G21	20,800	14,550	10,400	132	100
AMI8G15	14,960	10,470	7,480	112	84
AMI8G9	8,900	6,230	4,450	88	68
AMI8G5	5,250	3,670	2,630	68	52

Note 1: Exact usable gate count will vary depending on design interconnect and macro selection.

Note 2: 24 optional fixed power pins (6 in each corner) are not included in this number.

AMI8GX/AMI8S Features

- *3V, 5V, and combined 3V/5V operation:* Each individual pad can be driven independently by a 3V or 5V supply. 3V to 5V and 5V to 3V level shift is available in the I/O cells. The core can be either 3V for low power or 5V for high speed.
- *Excellent Performance:*
  - —210pS delay (FO+2) for a 2-input NAND gate.
  - —310 MHz maximum toggle rate on clocked flip-flops (AMI8S)
  - —260 MHz maximum toggle rate on clocked flip-flops (AMI8GX).
- *Operating Temperature equals -55 to 125°C:* Few competing products allow this range.
- *1 to 16mA drive per single I/O cell:* Selectable I/O drive with controllable slew rate. Extra I/O cells allow combined I/O drive up to 96mA without reducing pad count.
- *Clock tree generation:* ≤400 ps clock skew (fan out=3500 at 80 MHz).
- *Automatic test program generation:* Includes scan macros (NETSCAN™) for high fault coverage.
- JTAG Boundary Scan Macro Support
- *Cost driven architecture:*
  - — Offers both 2 and 3 level metal interconnect to provide the lowest user cost for the number of gates and pads required.
  - — Provides 6 extra power pads per corner to preserve more I/O cells for signal use.
- *Wide range of packaging:* Full QFP and LCC line, DIPs and PGAs, individual die and ball grid array. Burn-in capability as needed.
- Full operating voltage range from 2.7V to 5.5V
- ESD protection ≥ 2kV, latchup > 100mA
- Power equals 3.1 uW/MHz/cell (Standard Cell AMI8S)
  Power equals 3.2 uW/MHz/cell (Gate Array AMI8GX)
- *AMI libraries support most common workstations including:*

Cadence™	Synopsys®
Viewlogic®	Mentor Graphics®
Valid®	Verliog® simulation

Ikos® simulation accelerator (AMI's sign-off simulator)

AMI8S Standard Cell Family Overview

Feature		Description	Comment
Complexity		Up to 700,000 gates Up to 410,00 gates	50% memory, 50% megacell and user logic 100% user defined logic
I/O Count		Up to 512 pins Up to 585 pins	Test equipment limit; signal pins only Die size limit; includes power supply pins
Delay Time	*Internal Gate*	169ps (Fanouts=1,L=0mm) 205ps (Fanout=2,L=2mm)	2 input NAND gate, T=25°C, Vdd=5V
	Input Buffer	725ps (Fanout=2, L=2mm)	CMOS Input buffer, T=25°C, Vdd=5V
	Output Buffer	1.17ns(Cl-15pf)	CMOS Output buffer, T=25°C, Vdd=5V
Megacells		MG29C01,MG29C10,MG65C02 MG80C85, MG82Cxx, MGMC51	Functionally compatible with popular standard designs, soft macrocells allow user modifications.
Datapath Synthesizers		xx by yy multipliers, adders, subtracters, FIFOs, barrel shifters	See soft datapath library table.
Memory Compilers		syn. single port RAM (over 400 sizes) syn. dual port RAM (over 2000 sizes) sync. ROM (over 8000 sizes) asynchronous single port RAM	See memory compiler library table Under development

Note 1: Compact memory arrays increase gate count on an equivalent gate basis

Soft Datapath Library (xx by yy)

Name	Function
MGAxxyyDv	Adder
MGAxxyyEv	Adder-subtracter
MGBxxyyAv	Arithmetic/barrel shifter
MGBxxBv	Barrel shifter
MGBxxCv	Arithmetic shifter
MGCxxAv	2-function binary comparator
MGCxxBv	6-function comparator
MGDXXAV	Decrementer
MGFxxyyC1	Latch-based FIFO
MGIxxAv	Incrementer
MGIxxBv	Incrementer/decrementer
MGMxxyyDv	Signed/unsigned multiplier
MGMxxyyEv	Multiplier-accumulator
MGSxxyyAv	Signed/unsigned subtracter

American Microsystems, Inc.
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AMI SEMICONDUCTORS

CMOS EEPLDs

Electrically erasable programmable logic devices are ideal for small and medium-scale integration system design in low-volume production. Our lowest development cost ASICs, these devices deliver plenty of performance and offer a surprising measure of versatility and customer-control.

Built using our unique PEEL (Programmable Electrically Erasable Logic) technology, these PLDs are user-programmable, so there's no customer design and development risk. You may use industry-standard PLD programmers to configure the macrocells and, if necessary, to repeatedly erase and reconfigure them.

PEEL™ is a trademark of International CMOS Technology, Inc.

CMOS ROMs General Description

The AMI family of ROMs are mask programmable and organized by 8 or 16 bits. The devices are fully TTL compatible on all inputs and outputs and use a single +5V power supply. There are no requirements for clocks or refreshing, because they are static in operation. The three-state outputs facilitate memory expansion by allowing the outputs to be OR-ties to other devices. The control pin function and active level as well as the memory contents, are user defined. AMI is the largest U.S ROM supplier offering a full range 16K-16 Meg of ROM products.

Telecommunications Products

Station products
- DTMF Tone Generators
- Digital Time/Space Crosspoint Switches

Modems, Filters and PCM Products
- Bell 103/V.21 Single Chip MODEM
- Single Frequency Tuneable Bandpass Filter
- Programmable Low Pass Filter
- Programmable High Pass Filter
- A-LAW Synchronous Combo CODEC w/Filter
- u-LAW Synchronous Combo CODEC w/Filters

Display Driver Circuits
- 32-bit Driver

Mixed Signal Solution

AMI pioneered the development of the application specific integrated circuit in the late 1960's, and was one of the first companies to implement analog functions in ASICs. When you work with the engineers at AMI, you tap into true in-depth expertise in analog and mixed-signal design. The engineers at AMI have implemented hundreds of analog and mixed-signal ASICs over the past twenty years.

Cell-Based Custom Design Flexibility, Efficiency and Security

Cell-base custom chips integrate the greatest possible number of functions into a given area, contribute to product differentiation. and enhance security, since they are difficult to copy. Cell-based custom circuits are ideal for high-speed requirements, special interfaces, very high volume production, and mixed-signal applications.

AMI's cell-based custom design methodology allows system designers ultimate flexibility in realizing mixed-signal ASICs. AMI's Mixed Signal Design Solutions (MSDS) enables customers to design and simulate mixed-signal ASICs at their own facilities. MSDS can also be used in combination with AMI designed megacells, custom cells and existing standard cells.

CMOS PLD Family

Part No.	Architecture	Complexity	Speed	Replaces
18CV8	20pin E^{2}PLD	74 product terms x 38 input array	10/15/15ns Tpd	Bipolar PLDs
20CG10	24 pin E^{2}PLD	92 product terms x 44 input array	15/25ns Tpd	20VS, 20G10
22CV10Z	24 pin E^{2}PLD	132 product t terms x 44 inputs	25 ns Tpd	Bipolar PLDs Zero power mode
22CV10	24 pin E^{2}PLD	132 product terms x 44 inputs	15/25ns Tpd	Bipolar PLDs
PEEL153	20 pin E^{2}PLD	42 product terms x 36 inputs 10 sum terms x 32 product terms	30ns Tpd	Bipolar PLS 153
PEEL 173	24 pin E2PLD	42 product terms x 44 inputs 10 sum terms x 32 product terms	30ns Tpd	Bipolar PLS173
PEEL 253	20 pin E2PLD	42 product terms x 36 inputs 20 sum terms x 42 product terms	30ns Tpd	Bipolar PLS 153 PEEL153
PEEL 273	24 pinE2PLD	42 product terms x 44 inputs 20 sum terms x 42 product terms	30ns Tpd	Bipolar PLS173 PEEL173
PA7024	24 pin E2PLD	Over 80 sum of product terms	13/20ns Tpd	MULTI-PLDs

Military/Aerospace Applications

AMI has the capability to fully service your military/aerospace or other High Reliability ASIC requirements. AMI's ASIC manufacturing is certified to MIL-I-38535(QML) and MIL-STD-883, while also offering Hi-Rel Plastic processing. A full compliment of ceramic, plastic, and TAB packaging is available for these products

AMI's Hi-Rel Standard Products include MIL-STD-1553 and ARINC-629 Databus Terminals. Please also inquire about our active flat panel display driver products.

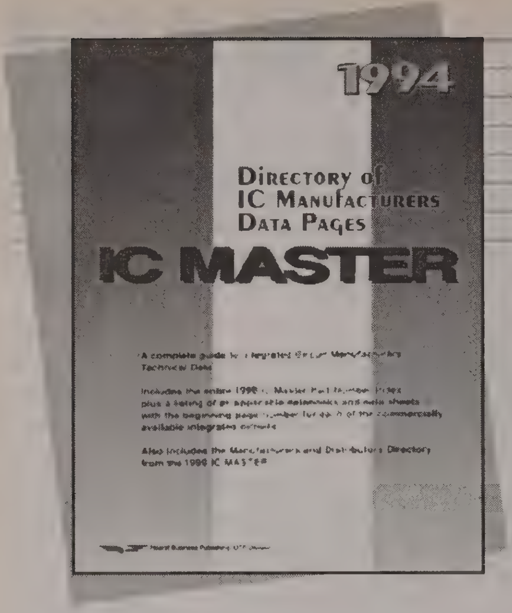
ASIC Foundry

AMI offers it's ASIC foundry customers a unique benefit in process capability and variability to match the need of your design. Quality in manufacturing is based on the Statistical Process Control customized to our manufacturing which includes a broad spectrum of CMOS and NMOS processes. Our expertise in SPC is continuing to optimize each individual process step with a real time monitoring procedure for operators and engineers to assure qualitative and quantitative measures. This approach has qualified AMI as the first ASIC company approved for QML. To continue our effort we are currently in the process of becoming ISO 9000 qualified.

ASIS Division-Application Specific Integrated Systems

The ASIS division of American Microsystems Inc. was chartered in 1990 with the mission to offer AMI's customers total system solutions beyond the standard packaged silicon. Since conception, the ASIS division has developed system solutions utilizing innovative MCM technologies (MCM-L, MCM-C, MCM-D).

The ASIS division has been a member of the PCMCIA for the past two years, and offers a full line of PCMCIA/JEIDA standard memory cards.



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ANALOG DEVICES

The pages that follow in IC Master contain product selection trees/guides that offer a quick and efficient way to select a group of products hat meet an application's primary specifications. The selection trees and guides that follow represent the major product categories found n Analog Devices' comprehensive set of reference manuals. Analog Devices also has available a full range of JAN, SMD, and 883 military products (Class S and B). Contact factory or your nearest sales office for more information. Listed below are the 1992/1993 reference manuals, each followed by its major categories.

Six Volumes with Complete Technical Data on High Performance Amplifiers, Data Converters, Analog Signal Processing, Signal Conditioning, Audio/Video Products, Digital Signal Processing Components and Related Products

DATA CONVERTER PRODUCTS REFERENCE MANUAL (VOLUME I)
D/A Converters
Audio/Video Products
S/D Converters
Communications Products
Digital Panel Meters
Digital Signal Processing Products
Bus Interface & Serial I/O Products
Application Specific ICs
Power Supplies

DATA CONVERTER PRODUCTS REFERENCE MANUAL (VOLUME II)
A/D Converters
Audio/Video Products
V/F & F/V Converters
Sample/Track-Hold Amplifiers
Switches & Multiplexers
Voltage References
Data Acquisition Subsystems
Analog I/O Ports
Application Specific ICs
Power Supplies

AMPLIFIER REFERENCE MANUAL
Operational Amplifiers
Comparators
Instrumentation Amplifiers
Isolation Amplifiers
Mixed-Signal ASICs
Power Supplies

SPECIAL LINEAR REFERENCE MANUAL
Analog Multipliers/Dividers
Signal Compression Components
RMS-to-DC Converters
Mass Storage Components
ATE Components
Special Function Components
Matched Transistors
Temperature Sensors
Signal Conditioning Components
Automotive Components
Digital Signal Processing Products
Mixed Signal ASICs
Power Supplies

MILITARY/AEROSPACE REFERENCE MANUAL
Data Converters
Amplifiers
Analog Signal Processing
Voltage References
Switches and Multiplexers
Data Acquisition Subsystems
Digital Signal Processing Components
Special Function Components
Space Qualified Products
Radiation Information

APPLICATIONS REFERENCE MANUAL
A compilation of application notes, technical articles and design tutorials spanning 22 subject areas including:
Audio and Video Circuits
A/D and D/A Conversion
Data Acquisition
Signal Conditioning
Digital Signal Processing
Sigma-Delta Conversion

For literature, contact the Analog Devices Literature Distribution Center: telephone (800) 262-5643 or fax (617) 821-4273.

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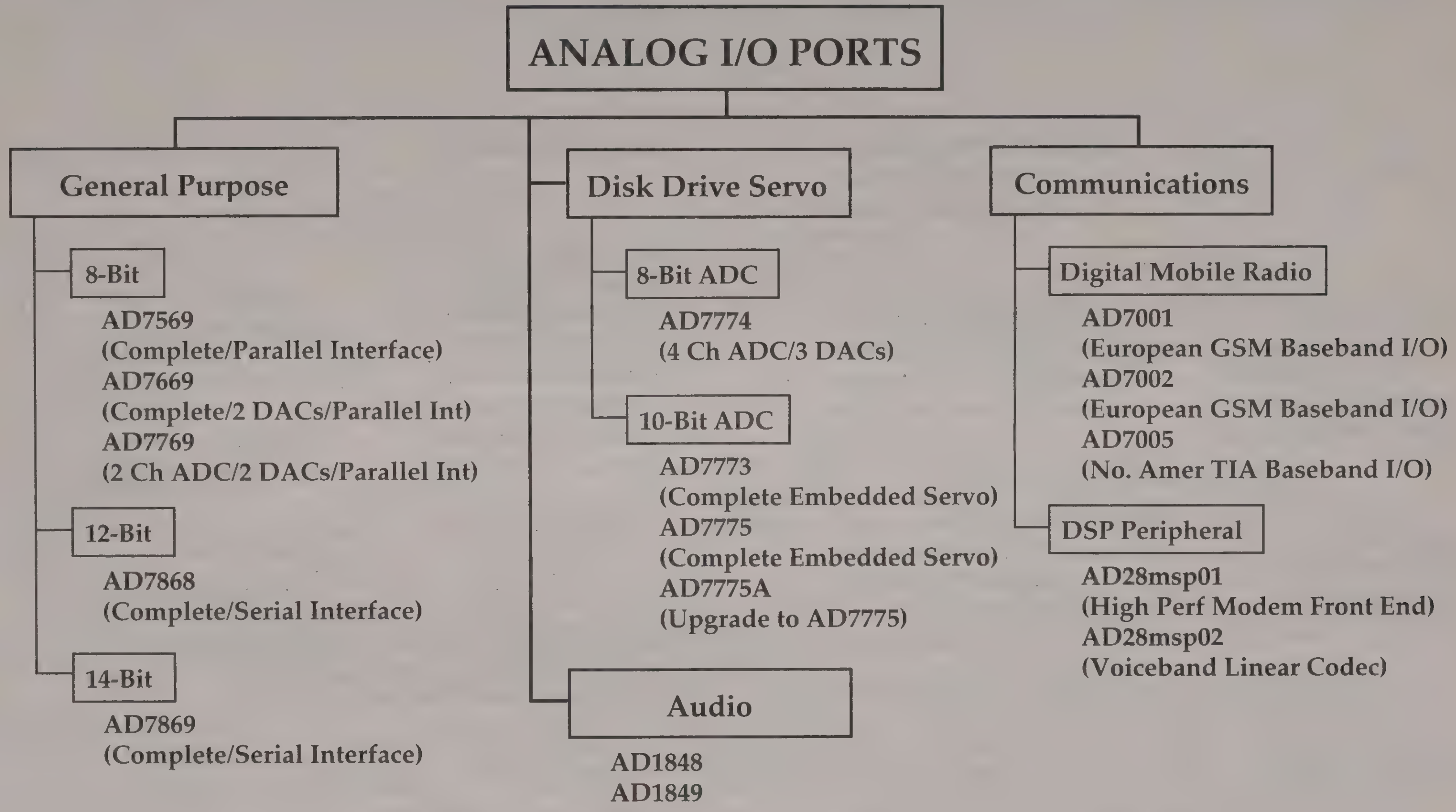
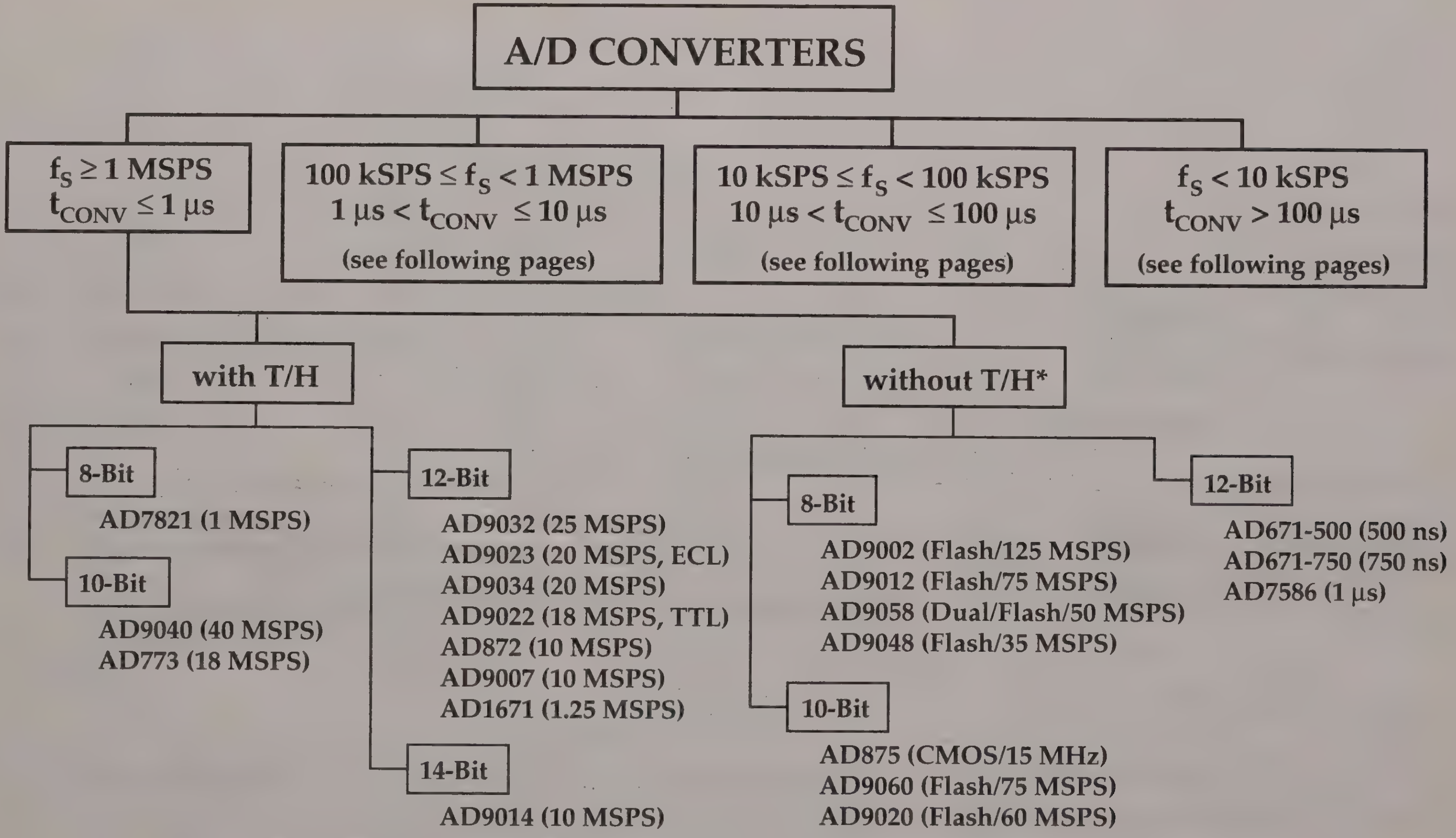
Analog I/O Ports—Selection Tree



ANALOG I/O PORTS

- General Purpose
  - 8-Bit
    - AD7569 (Complete/Parallel Interface)
    - AD7669 (Complete/2 DACs/Parallel Int)
    - AD7769 (2 Ch ADC/2 DACs/Parallel Int)
  - 12-Bit
    - AD7868 (Complete/Serial Interface)
  - 14-Bit
    - AD7869 (Complete/Serial Interface)
- Disk Drive Servo
  - 8-Bit ADC
    - AD7774 (4 Ch ADC/3 DACs)
  - 10-Bit ADC
    - AD7773 (Complete Embedded Servo)
    - AD7775 (Complete Embedded Servo)
    - AD7775A (Upgrade to AD7775)
- Audio
  - AD1848
  - AD1849
- Communications
  - Digital Mobile Radio
    - AD7001 (European GSM Baseband I/O)
    - AD7002 (European GSM Baseband I/O)
    - AD7005 (No. Amer TIA Baseband I/O)
  - DSP Peripheral
    - AD28msp01 (High Perf Modem Front End)
    - AD28msp02 (Voiceband Linear Codec)

Analog-to-Digital Converters—Selection Trees


A/D CONVERTERS
$f_S \geq 1$ MSPS
$t_{CONV} \leq 1\ \mu s$
100 kSPS $\leq f_S < 1$ MSPS
1 µs $< t_{CONV} \leq 10\ \mu s$
(see following pages)
10 kSPS $\leq f_S < 100$ kSPS
10 µs $< t_{CONV} \leq 100\ \mu s$
(see following pages)
$f_S < 10$ kSPS
$t_{CONV} > 100\ \mu s$
(see following pages)
with T/H
8-Bit
AD7821 (1 MSPS)
10-Bit
AD9040 (40 MSPS)
AD773 (18 MSPS)
12-Bit
AD9032 (25 MSPS)
AD9023 (20 MSPS, ECL)
AD9034 (20 MSPS)
AD9022 (18 MSPS, TTL)
AD872 (10 MSPS)
AD9007 (10 MSPS)
AD1671 (1.25 MSPS)
14-Bit
AD9014 (10 MSPS)
without T/H*
8-Bit
AD9002 (Flash/125 MSPS)
AD9012 (Flash/75 MSPS)
AD9058 (Dual/Flash/50 MSPS)
AD9048 (Flash/35 MSPS)
10-Bit
AD875 (CMOS/15 MHz)
AD9060 (Flash/75 MSPS)
AD9020 (Flash/60 MSPS)
12-Bit
AD671-500 (500 ns)
AD671-750 (750 ns)
AD7586 (1 µs)

*Flash ADCs generally do not require a T/H, however performance can be enhanced with the AD9101 Samplifier™.

A/D CONVERTERS
100 kSPS ≤ f_S < 1 MSPS[1]
1 µs < t_{CONV} ≤ 10 µs

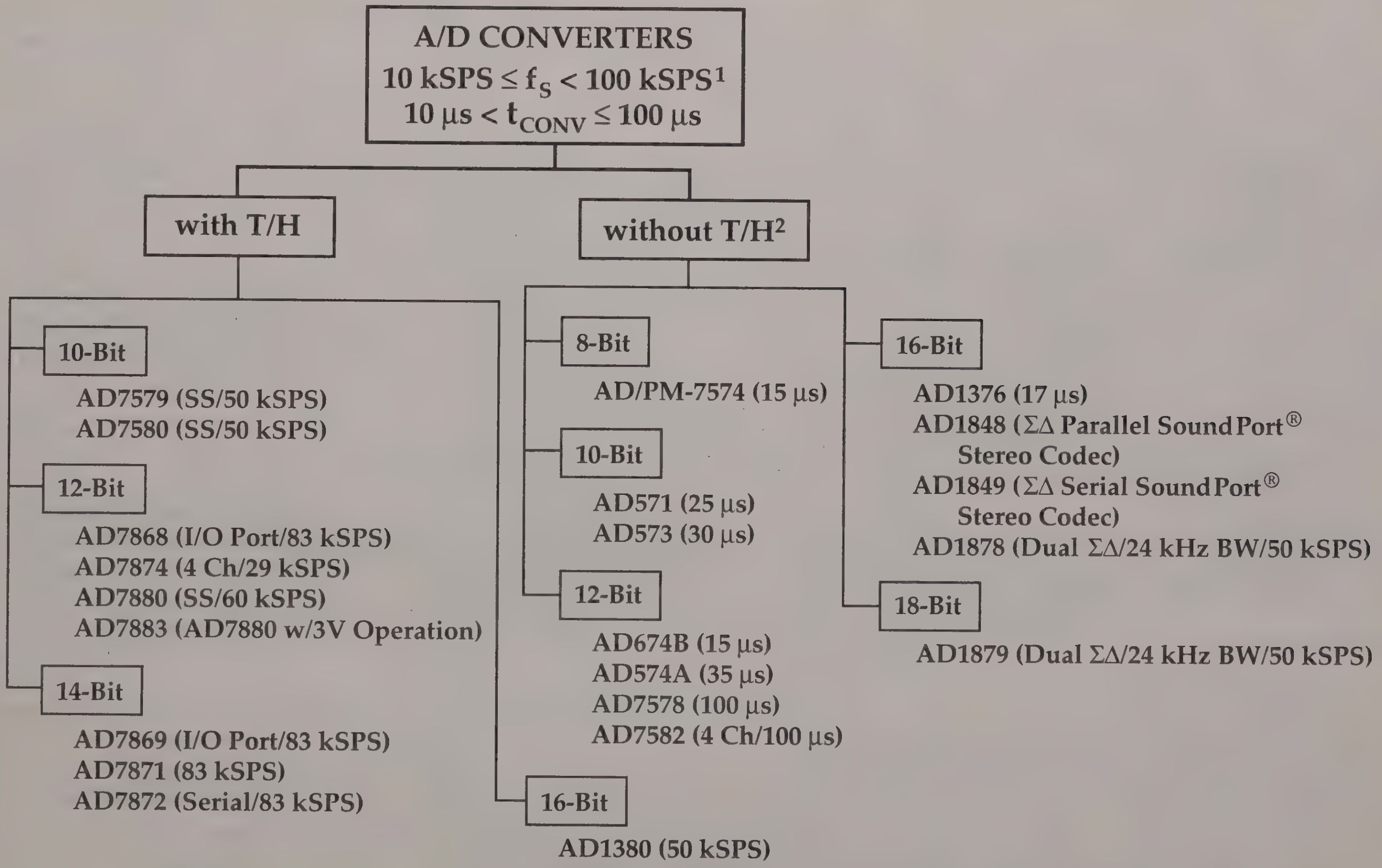
- **with T/H**
  - **8-Bit**
    - AD7569 (I/O Port/400 kSPS)
    - AD7669 (I/O Port/400 kSPS)
    - AD7769 (2 Ch I/O Port/400 kSPS)
    - AD7824 (4 Ch/400 kSPS)
    - AD7828 (8 Ch/400 kSPS)
  - **10-Bit**
    - AD7776 (400 kSPS)
    - AD7777 (4 Ch/400 kSPS)
    - AD7778 (8 Ch/400 kSPS)
  - **12-Bit**
    - AD7886 (750 kSPS)
    - AD678 (200 kSPS)
    - AD1341 (8-16 Ch/FIFO/150 kSPS)
    - AD7892 (SS/400 kSPS)
    - AD7893 (SS/8-Pin/140 kSPS)
    - AD1332 (FIFO/125 kSPS)
    - AD7870 (100 kSPS)
    - AD7875 (100 kSPS)
    - AD7876 (100 kSPS)
    - AD7878 (FIFO/100 kSPS)
    - AD1674 (100 kSPS)
    - AD7890 (SS/8 Ch/100 kSPS)
    - AD7891 (SS/8 Ch/400 kSPS)
  - **14-Bit**
    - AD679 (128 kSPS)
    - AD779 (128 kSPS)
  - **16-Bit**
    - AD1382 (500 kSPS)
    - AD1385 (500 kSPS)
    - AD7882 (400 kSPS)
    - AD7884 (166 kSPS)
    - AD7885 (166 kSPS)
    - AD1876 (100 kSPS)
    - AD676 (100 kSPS)
    - AD677 (100 kSPS)
- **without T/H[2]**
  - **8-Bit**
    - AD7576 (10 µs)
  - **10-Bit**
    - ADC-910 (6 µs)
  - **12-Bit**
    - AD7572A (3 µs)
    - ADC-170 (5.6 µs)
    - AD774B (8 µs)
    - ADC-912A (10 µs)
  - **16-Bit**
    - AD776 (ΣΔ/50 kHz BW/100 kSPS)

SS – Single Supply

[1] Primary selection of ΣΔ ADCs is by output data rate in kSPS.

[2] ΣΔ ADCs generally do not require a T/H.

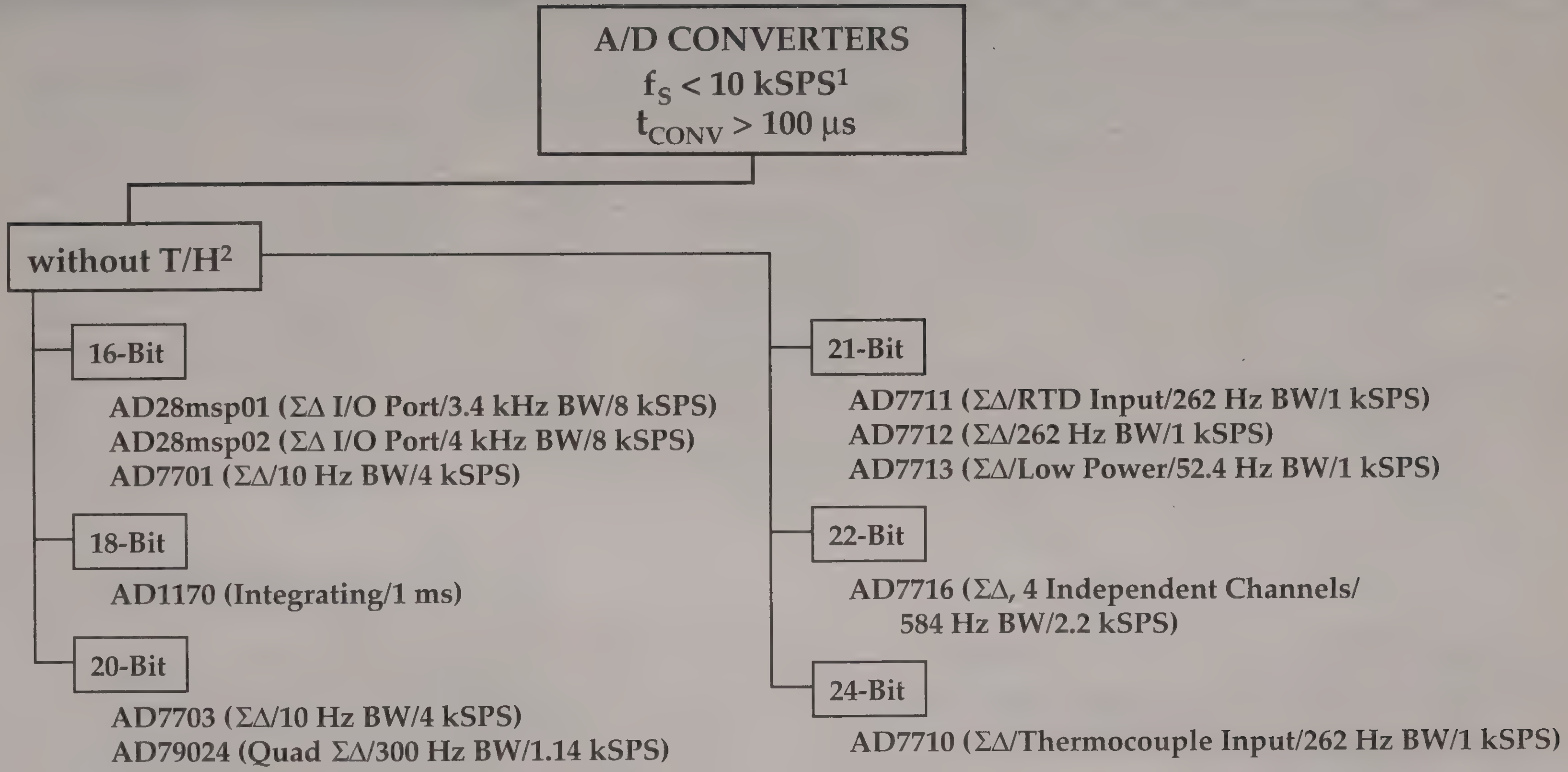
Analog-to-Digital Converters—Selection Trees


A/D CONVERTERS
10 kSPS ≤ f_S < 100 kSPS[1]
10 µs < t_{CONV} ≤ 100 µs
with T/H
without T/H[2]
10-Bit
AD7579 (SS/50 kSPS)
AD7580 (SS/50 kSPS)
12-Bit
AD7868 (I/O Port/83 kSPS)
AD7874 (4 Ch/29 kSPS)
AD7880 (SS/60 kSPS)
AD7883 (AD7880 w/3V Operation)
14-Bit
AD7869 (I/O Port/83 kSPS)
AD7871 (83 kSPS)
AD7872 (Serial/83 kSPS)
16-Bit
AD1380 (50 kSPS)
8-Bit
AD/PM-7574 (15 µs)
10-Bit
AD571 (25 µs)
AD573 (30 µs)
12-Bit
AD674B (15 µs)
AD574A (35 µs)
AD7578 (100 µs)
AD7582 (4 Ch/100 µs)
16-Bit
AD1376 (17 µs)
AD1848 (ΣΔ Parallel SoundPort® Stereo Codec)
AD1849 (ΣΔ Serial SoundPort® Stereo Codec)
AD1878 (Dual ΣΔ/24 kHz BW/50 kSPS)
18-Bit
AD1879 (Dual ΣΔ/24 kHz BW/50 kSPS)

SS – Single Supply

[1] Primary selection of ΣΔ ADCs is by output data rate in kSPS.

[2] ΣΔ ADCs generally do not require a T/H.



A/D CONVERTERS
$f_S < 10$ kSPS[1]
$t_{CONV} > 100\ \mu s$

without T/H[2]

16-Bit
- AD28msp01 (ΣΔ I/O Port/3.4 kHz BW/8 kSPS)
- AD28msp02 (ΣΔ I/O Port/4 kHz BW/8 kSPS)
- AD7701 (ΣΔ/10 Hz BW/4 kSPS)

18-Bit
- AD1170 (Integrating/1 ms)

20-Bit
- AD7703 (ΣΔ/10 Hz BW/4 kSPS)
- AD79024 (Quad ΣΔ/300 Hz BW/1.14 kSPS)

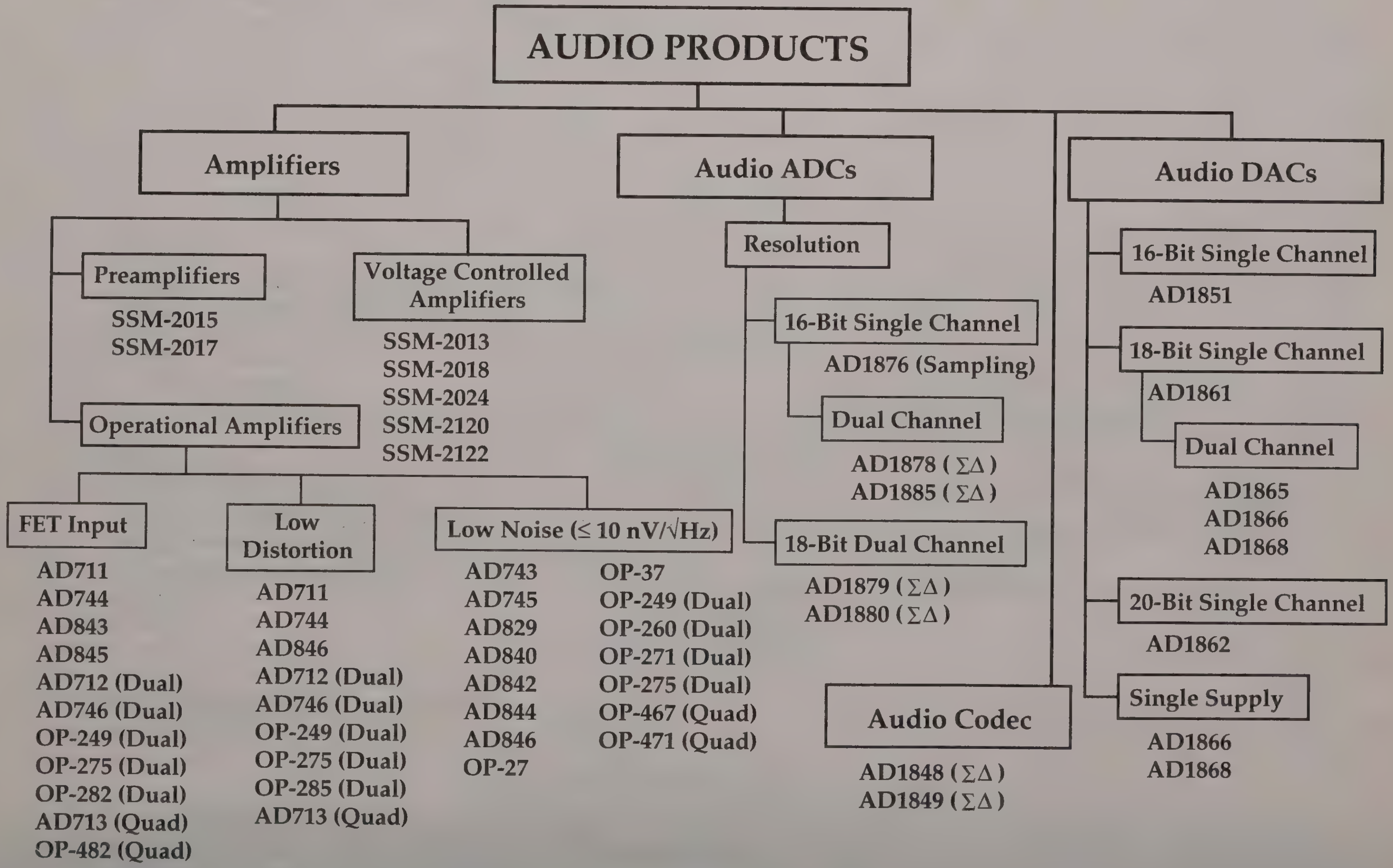
21-Bit
- AD7711 (ΣΔ/RTD Input/262 Hz BW/1 kSPS)
- AD7712 (ΣΔ/262 Hz BW/1 kSPS)
- AD7713 (ΣΔ/Low Power/52.4 Hz BW/1 kSPS)

22-Bit
- AD7716 (ΣΔ, 4 Independent Channels/ 584 Hz BW/2.2 kSPS)

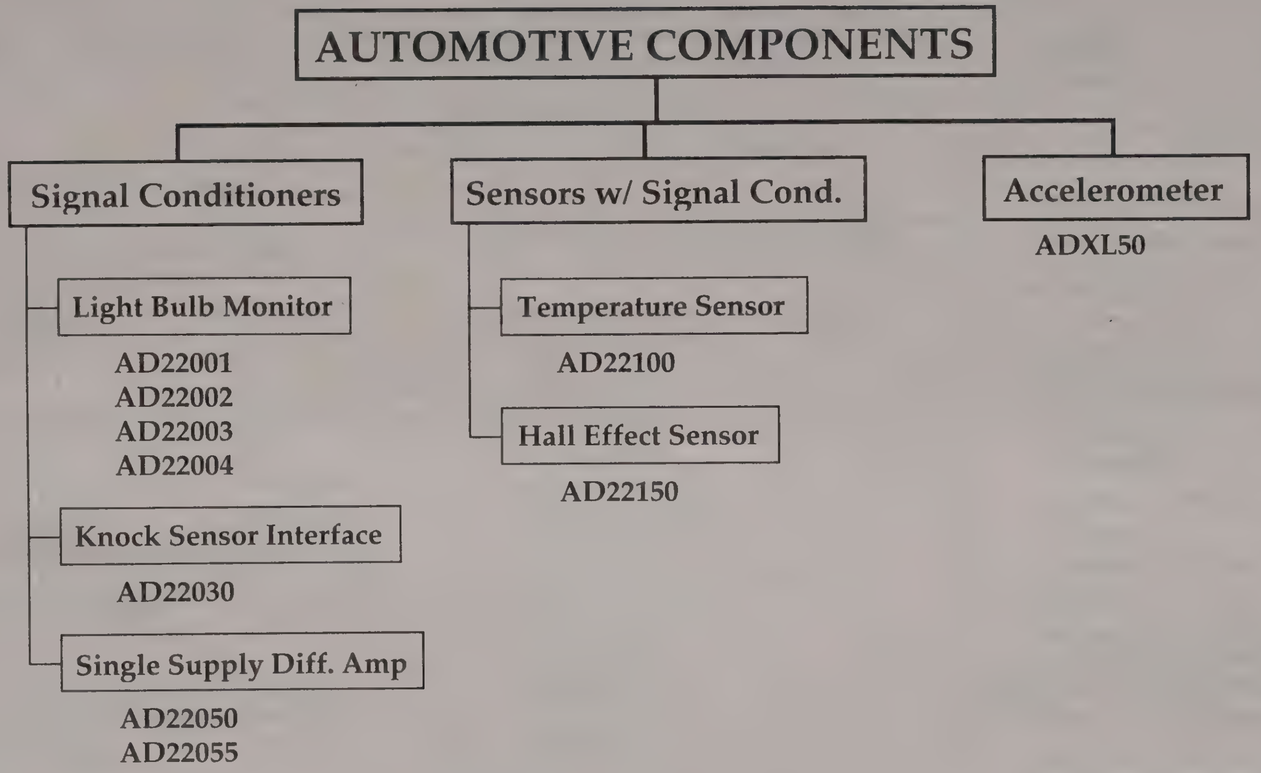
24-Bit
- AD7710 (ΣΔ/Thermocouple Input/262 Hz BW/1 kSPS)

[1] Primary selection of ΣΔ ADCs is by output data rate in kSPS.
[2] ΣΔ ADCs generally do not require a T/H.

Audio Products—Selection Tree


AUDIO PRODUCTS
Amplifiers
Preamplifiers
SSM-2015
SSM-2017
Voltage Controlled Amplifiers
SSM-2013
SSM-2018
SSM-2024
SSM-2120
SSM-2122
Operational Amplifiers
FET Input
AD711
AD744
AD843
AD845
AD712 (Dual)
AD746 (Dual)
OP-249 (Dual)
OP-275 (Dual)
OP-282 (Dual)
AD713 (Quad)
OP-482 (Quad)
Low Distortion
AD711
AD744
AD846
AD712 (Dual)
AD746 (Dual)
OP-249 (Dual)
OP-275 (Dual)
OP-285 (Dual)
AD713 (Quad)
Low Noise (≤ 10 nV/√Hz)
AD743
AD745
AD829
AD840
AD842
AD844
AD846
OP-27
OP-37
OP-249 (Dual)
OP-260 (Dual)
OP-271 (Dual)
OP-275 (Dual)
OP-467 (Quad)
OP-471 (Quad)
Audio ADCs
Resolution
16-Bit Single Channel
AD1876 (Sampling)
Dual Channel
AD1878 (ΣΔ)
AD1885 (ΣΔ)
18-Bit Dual Channel
AD1879 (ΣΔ)
AD1880 (ΣΔ)
Audio Codec
AD1848 (ΣΔ)
AD1849 (ΣΔ)
Audio DACs
16-Bit Single Channel
AD1851
18-Bit Single Channel
AD1861
Dual Channel
AD1865
AD1866
AD1868
20-Bit Single Channel
AD1862
Single Supply
AD1866
AD1868

Automotive Components—Selection Tree

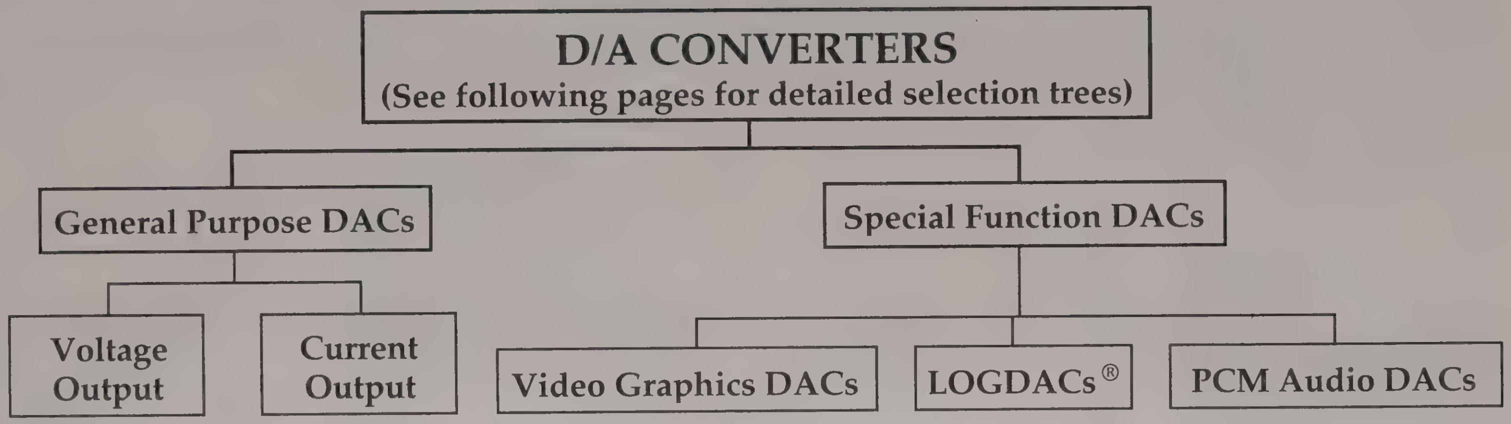

AUTOMOTIVE COMPONENTS
Signal Conditioners
Sensors w/ Signal Cond.
Accelerometer
ADXL50
Light Bulb Monitor
AD22001
AD22002
AD22003
AD22004
Knock Sensor Interface
AD22030
Single Supply Diff. Amp
AD22050
AD22055
Temperature Sensor
AD22100
Hall Effect Sensor
AD22150

Communications Products—Selection Tree

COMMUNICATIONS PRODUCTS

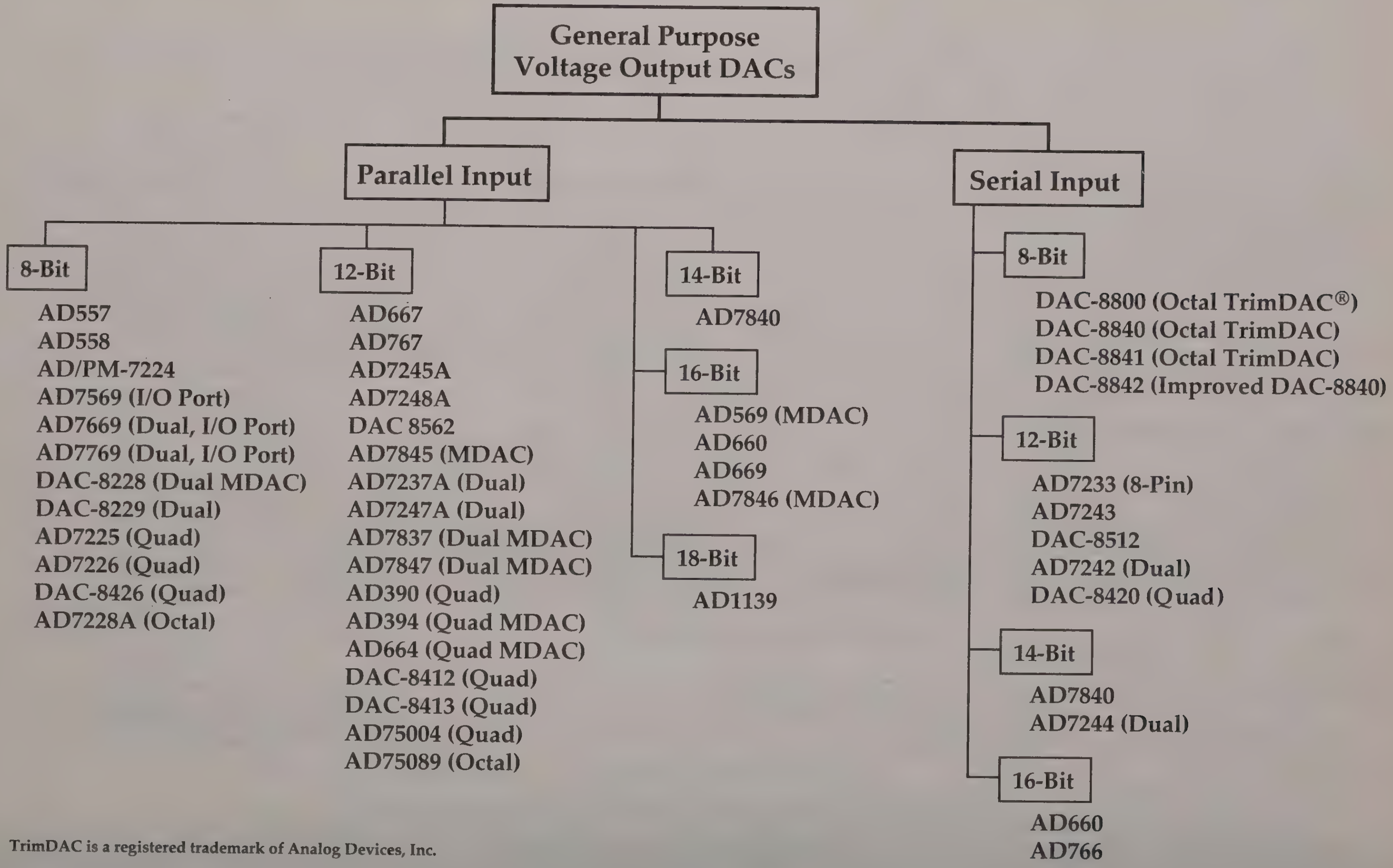
- **Analog I/O Ports**
  - **General Purpose**
    - AD7868 (12-Bit/Serial Interface)
    - AD7869 (14-Bit/Serial Interface)
  - **Digital Mobile Radio**
    - AD7001 (European GSM Baseband)
    - AD7002 (European GSM Baseband)
    - AD7005 (No. Amer. TIA Baseband)
    - AD7010 (Japan RCR Baseband Tx)
    - AD7011 (No. Amer. IS-54 Baseband Tx)
  - **DSP Peripherals**
    - AD28msp01 (High Perf Modem Front End)
    - AD28msp02 (Voiceband Linear Codec)
- **Line Drivers/Receivers**
  - **RS-232 Standard (#Drv/#Rcv)**
    - AD230 (5/0)
    - AD231 (2/2)
    - AD232 (2/2, +5V)
    - AD233 (2/2, No Ext Caps)
    - AD234 (4/0)
    - AD235 (5/5, No Ext Caps)
    - AD236 (4/3)
    - AD237 (5/3)
    - AD238 (4/4)
    - AD239 (3/5)
    - AD241 (4/5)
    - AD241A (Improved AD241)
  - **Dual RS-232/RS-422 Standard**
    - AD7306 (Drivers: 2[232] & 1[422]) (Receivers: 1[232] & 1[232 or 422])
  - **RS-485 Standard (#Drv/#Rcv)**
    - AD485 (1/1)
- **Telecommunications**
  - LIU-01 (Serial Data Receiver)
  - RPT-86 (T1/E1 PCM Repeater)
  - RPT-87 (T1/E1 PCM Repeater)
- **Direct Digital Synthesis**
  - AD7008 (IF Modulator)
  - AD9901 (Phase/Frequency Discriminator)
  - AD9955 (85 MHz CMOS Direct Digital Synthesizer)
  - AD9955/PCB (complete 85 MHz DDS Subsystem)
- **Analog Filters**
  - AD7341 (Reconstruction Filter)
  - AD7371 (Antialiasing Filter)
- **Clock Recovery/Data Retiming**
  - AD800
  - AD802
  - AD803
  - AD805

Digital-to-Analog Converters— Selection Trees

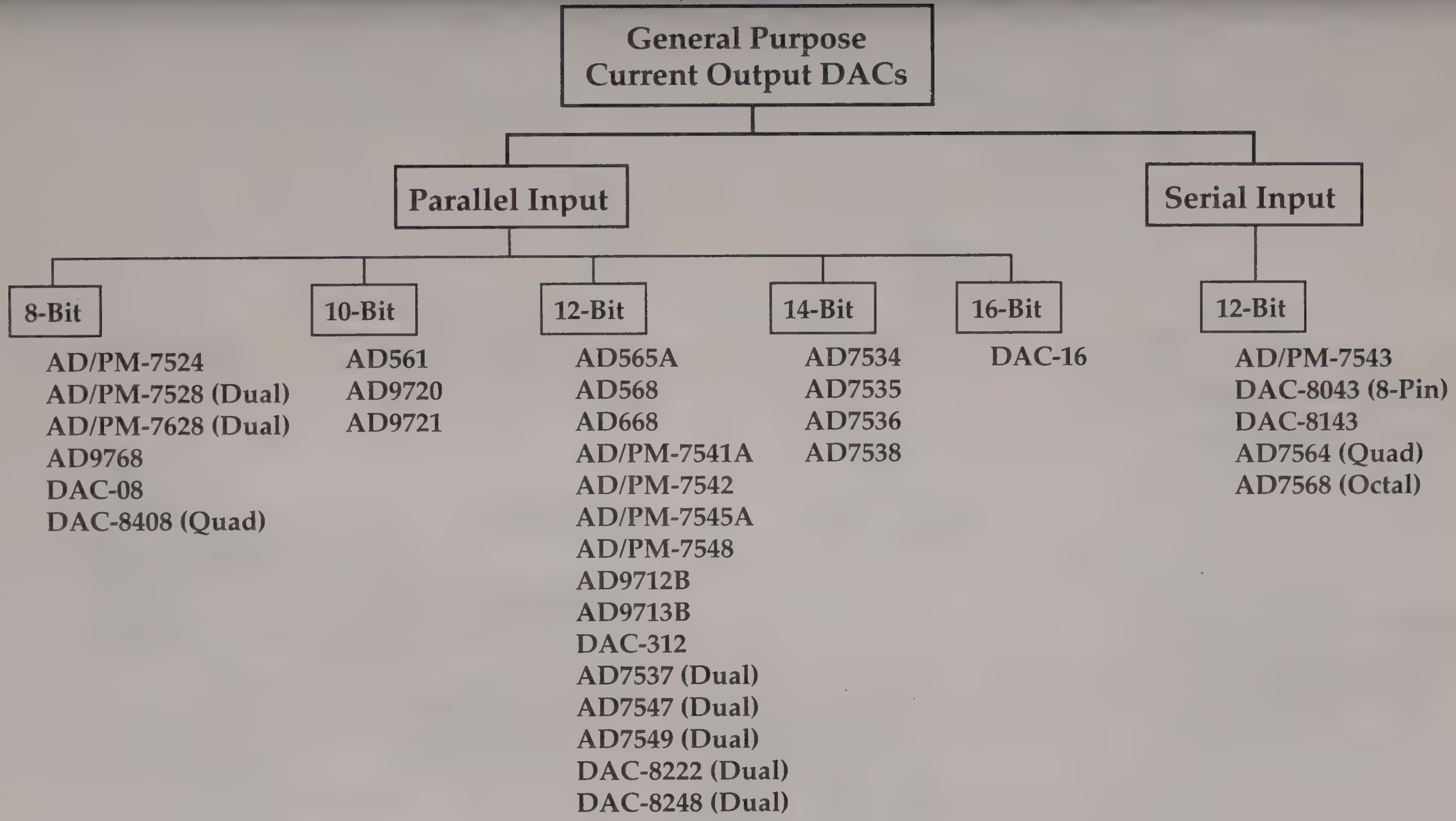

D/A CONVERTERS
(See following pages for detailed selection trees)
General Purpose DACs
Special Function DACs
Voltage Output
Current Output
Video Graphics DACs
LOGDACs®
PCM Audio DACs

LOGDAC is a registered trademark of Analog Devices, Inc.

Digital-to-Analog Converters—Selection Trees


General Purpose Voltage Output DACs
Parallel Input
8-Bit
AD557
AD558
AD/PM-7224
AD7569 (I/O Port)
AD7669 (Dual, I/O Port)
AD7769 (Dual, I/O Port)
DAC-8228 (Dual MDAC)
DAC-8229 (Dual)
AD7225 (Quad)
AD7226 (Quad)
DAC-8426 (Quad)
AD7228A (Octal)
12-Bit
AD667
AD767
AD7245A
AD7248A
DAC 8562
AD7845 (MDAC)
AD7237A (Dual)
AD7247A (Dual)
AD7837 (Dual MDAC)
AD7847 (Dual MDAC)
AD390 (Quad)
AD394 (Quad MDAC)
AD664 (Quad MDAC)
DAC-8412 (Quad)
DAC-8413 (Quad)
AD75004 (Quad)
AD75089 (Octal)
14-Bit
AD7840
16-Bit
AD569 (MDAC)
AD660
AD669
AD7846 (MDAC)
18-Bit
AD1139
Serial Input
8-Bit
DAC-8800 (Octal TrimDAC®)
DAC-8840 (Octal TrimDAC)
DAC-8841 (Octal TrimDAC)
DAC-8842 (Improved DAC-8840)
12-Bit
AD7233 (8-Pin)
AD7243
DAC-8512
AD7242 (Dual)
DAC-8420 (Quad)
14-Bit
AD7840
AD7244 (Dual)
16-Bit
AD660
AD766

TrimDAC is a registered trademark of Analog Devices, Inc.

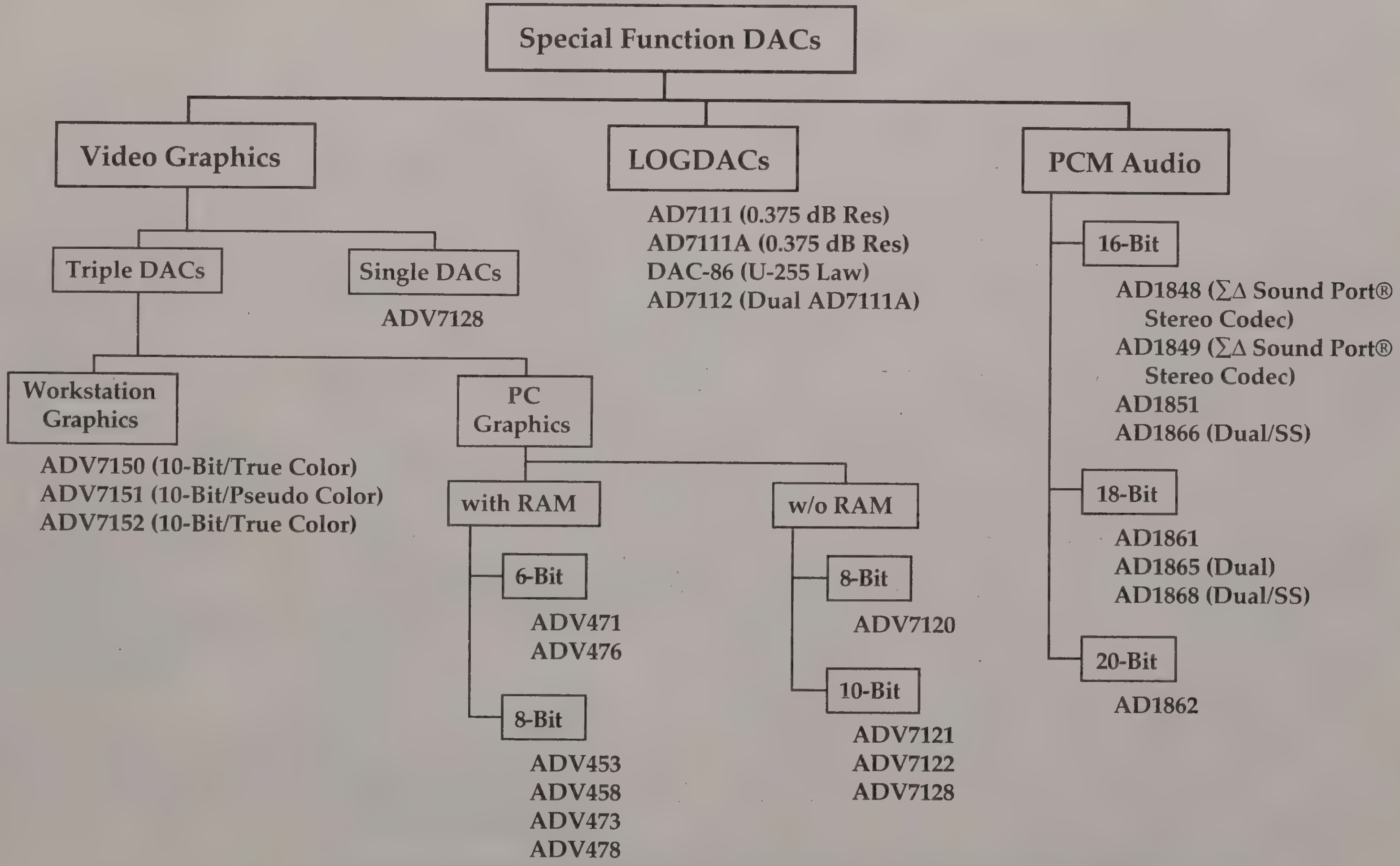


General Purpose Current Output DACs

- Parallel Input
  - 8-Bit
    - AD/PM-7524
    - AD/PM-7528 (Dual)
    - AD/PM-7628 (Dual)
    - AD9768
    - DAC-08
    - DAC-8408 (Quad)
  - 10-Bit
    - AD561
    - AD9720
    - AD9721
  - 12-Bit
    - AD565A
    - AD568
    - AD668
    - AD/PM-7541A
    - AD/PM-7542
    - AD/PM-7545A
    - AD/PM-7548
    - AD9712B
    - AD9713B
    - DAC-312
    - AD7537 (Dual)
    - AD7547 (Dual)
    - AD7549 (Dual)
    - DAC-8222 (Dual)
    - DAC-8248 (Dual)
  - 14-Bit
    - AD7534
    - AD7535
    - AD7536
    - AD7538
  - 16-Bit
    - DAC-16
- Serial Input
  - 12-Bit
    - AD/PM-7543
    - DAC-8043 (8-Pin)
    - DAC-8143
    - AD7564 (Quad)
    - AD7568 (Octal)

Analog Devices

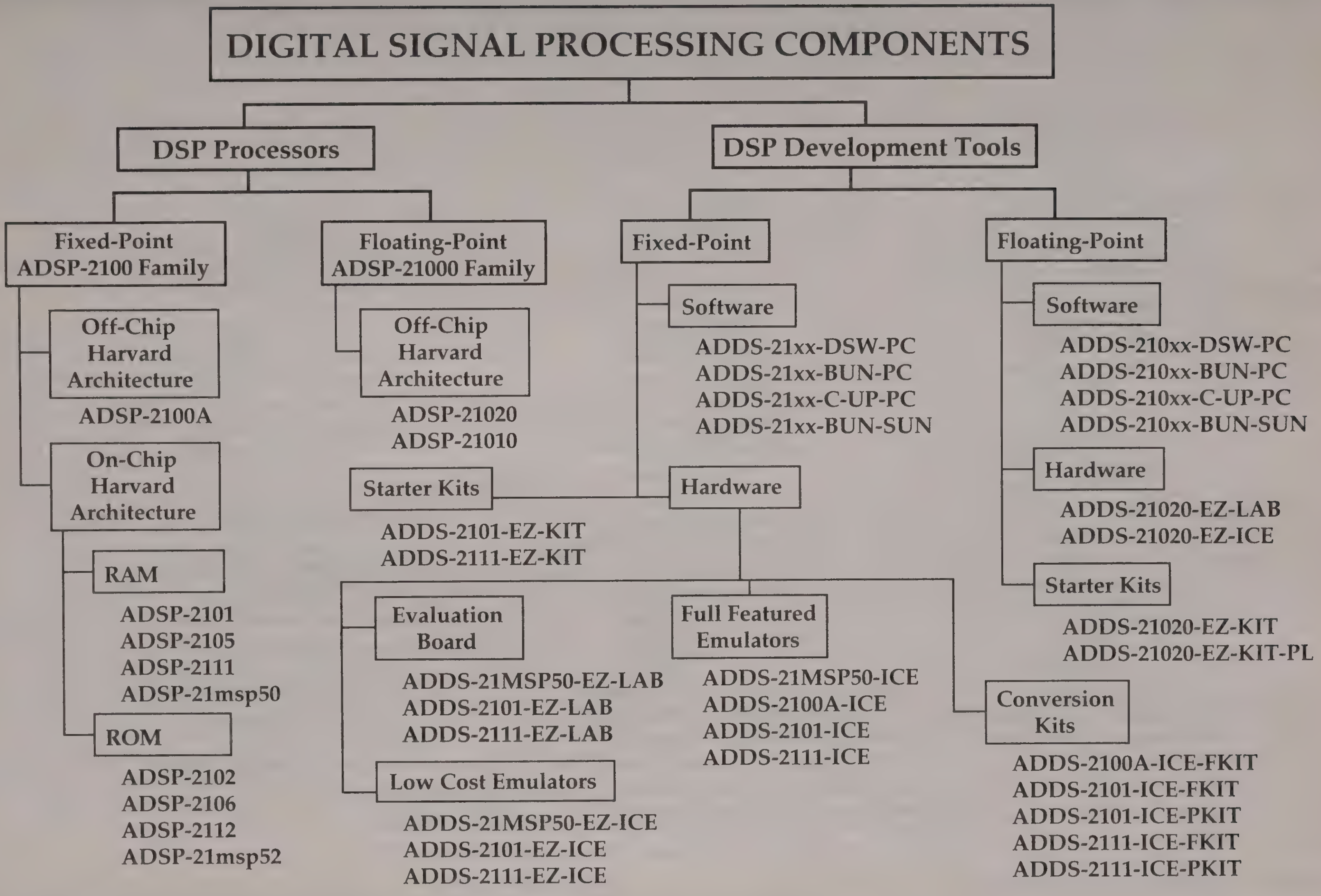
Digital-to-Analog Converters—Selection Trees


Special Function DACs
Video Graphics
Triple DACs
Single DACs
ADV7128
Workstation Graphics
ADV7150 (10-Bit/True Color)
ADV7151 (10-Bit/Pseudo Color)
ADV7152 (10-Bit/True Color)
PC Graphics
with RAM
6-Bit
ADV471
ADV476
8-Bit
ADV453
ADV458
ADV473
ADV478
w/o RAM
8-Bit
ADV7120
10-Bit
ADV7121
ADV7122
ADV7128
LOGDACs
AD7111 (0.375 dB Res)
AD7111A (0.375 dB Res)
DAC-86 (U-255 Law)
AD7112 (Dual AD7111A)
PCM Audio
16-Bit
AD1848 (∑Δ Sound Port® Stereo Codec)
AD1849 (∑Δ Sound Port® Stereo Codec)
AD1851
AD1866 (Dual/SS)
18-Bit
AD1861
AD1865 (Dual)
AD1868 (Dual/SS)
20-Bit
AD1862

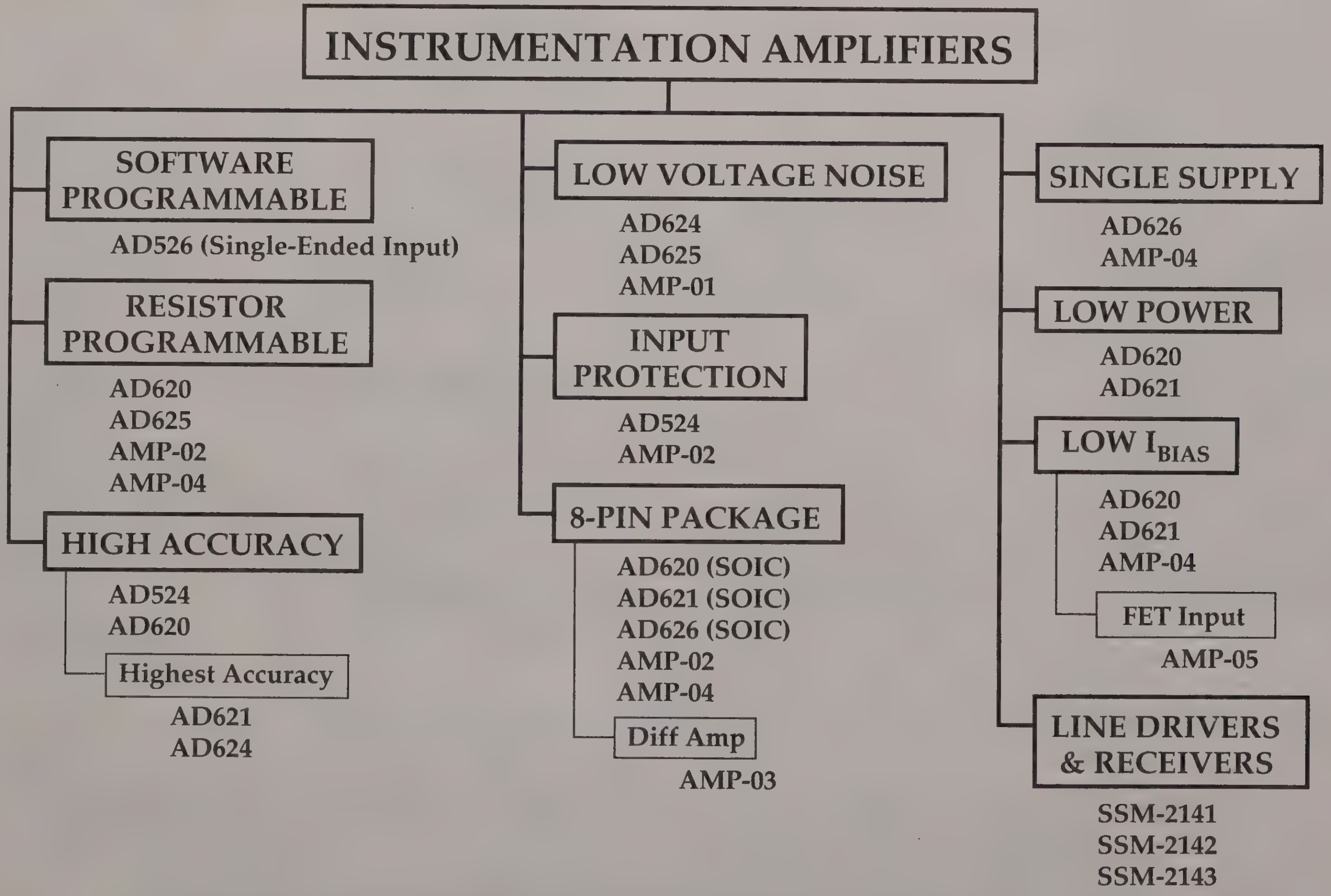
SS – Single Supply

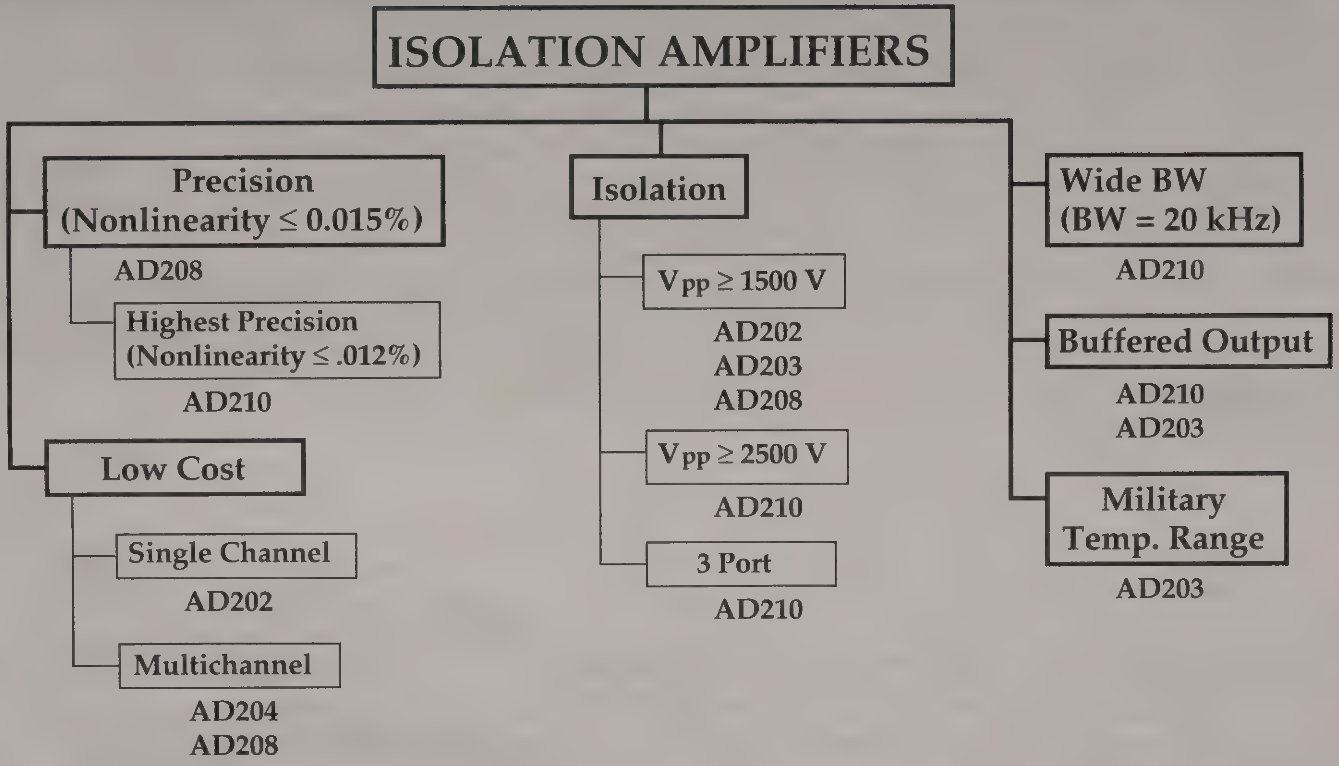
*VGA is a trademark of International Business Machines Corp.
SOUNDPORT is a trademark of Analog Devices, Inc.

Digital Signal Processing Components — Selection Tree

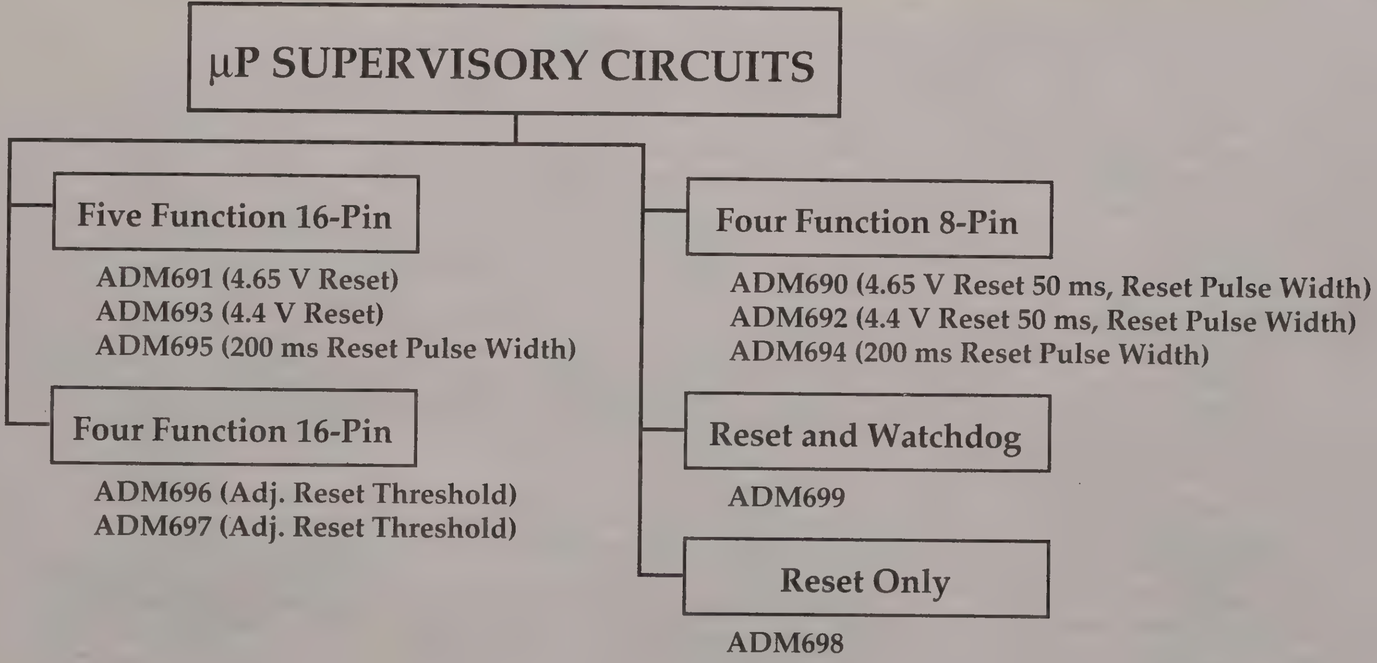

DIGITAL SIGNAL PROCESSING COMPONENTS
DSP Processors
DSP Development Tools
Fixed-Point ADSP-2100 Family
Off-Chip Harvard Architecture
ADSP-2100A
On-Chip Harvard Architecture
RAM
ADSP-2101
ADSP-2105
ADSP-2111
ADSP-21msp50
ROM
ADSP-2102
ADSP-2106
ADSP-2112
ADSP-21msp52
Floating-Point ADSP-21000 Family
Off-Chip Harvard Architecture
ADSP-21020
ADSP-21010
Fixed-Point
Software
ADDS-21xx-DSW-PC
ADDS-21xx-BUN-PC
ADDS-21xx-C-UP-PC
ADDS-21xx-BUN-SUN
Hardware
Starter Kits
ADDS-2101-EZ-KIT
ADDS-2111-EZ-KIT
Evaluation Board
ADDS-21MSP50-EZ-LAB
ADDS-2101-EZ-LAB
ADDS-2111-EZ-LAB
Low Cost Emulators
ADDS-21MSP50-EZ-ICE
ADDS-2101-EZ-ICE
ADDS-2111-EZ-ICE
Full Featured Emulators
ADDS-21MSP50-ICE
ADDS-2100A-ICE
ADDS-2101-ICE
ADDS-2111-ICE
Conversion Kits
ADDS-2100A-ICE-FKIT
ADDS-2101-ICE-FKIT
ADDS-2101-ICE-PKIT
ADDS-2111-ICE-FKIT
ADDS-2111-ICE-PKIT
Floating-Point
Software
ADDS-210xx-DSW-PC
ADDS-210xx-BUN-PC
ADDS-210xx-C-UP-PC
ADDS-210xx-BUN-SUN
Hardware
ADDS-21020-EZ-LAB
ADDS-21020-EZ-ICE
Starter Kits
ADDS-21020-EZ-KIT
ADDS-21020-EZ-KIT-PL

Instrumentation Amplifiers—Selection Tree


INSTRUMENTATION AMPLIFIERS
SOFTWARE PROGRAMMABLE
AD526 (Single-Ended Input)
RESISTOR PROGRAMMABLE
AD620
AD625
AMP-02
AMP-04
HIGH ACCURACY
AD524
AD620
Highest Accuracy
AD621
AD624
LOW VOLTAGE NOISE
AD624
AD625
AMP-01
INPUT PROTECTION
AD524
AMP-02
8-PIN PACKAGE
AD620 (SOIC)
AD621 (SOIC)
AD626 (SOIC)
AMP-02
AMP-04
Diff Amp
AMP-03
SINGLE SUPPLY
AD626
AMP-04
LOW POWER
AD620
AD621
LOW I_BIAS
AD620
AD621
AMP-04
FET Input
AMP-05
LINE DRIVERS & RECEIVERS
SSM-2141
SSM-2142
SSM-2143


ISOLATION AMPLIFIERS
Precision
(Nonlinearity ≤ 0.015%)
AD208
Highest Precision
(Nonlinearity ≤ .012%)
AD210
Low Cost
Single Channel
AD202
Multichannel
AD204
AD208
Isolation
Vpp ≥ 1500 V
AD202
AD203
AD208
Vpp ≥ 2500 V
AD210
3 Port
AD210
Wide BW
(BW = 20 kHz)
AD210
Buffered Output
AD210
AD203
Military
Temp. Range
AD203

Microprocessor Supervisory Circuits— Selection Tree


µP SUPERVISORY CIRCUITS
Five Function 16-Pin
ADM691 (4.65 V Reset)
ADM693 (4.4 V Reset)
ADM695 (200 ms Reset Pulse Width)
Four Function 16-Pin
ADM696 (Adj. Reset Threshold)
ADM697 (Adj. Reset Threshold)
Four Function 8-Pin
ADM690 (4.65 V Reset 50 ms, Reset Pulse Width)
ADM692 (4.4 V Reset 50 ms, Reset Pulse Width)
ADM694 (200 ms Reset Pulse Width)
Reset and Watchdog
ADM699
Reset Only
ADM698

Function Table:

ADM690–ADM699 Functions	ADM690	ADM691	ADM692	ADM693	ADM694	ADM695	ADM696	ADM697	ADM698	ADM699
Fixed Power Up/Down Reset	✓	✓	✓	✓	✓	✓			✓	✓
Variable Power Up/Down Reset							✓	✓		
Battery Backup Switching	✓	✓	✓	✓	✓	✓	✓			
Watchdog Timer	✓	✓	✓	✓	✓	✓	✓	✓		✓
Power Failing Warning	✓	✓	✓	✓	✓	✓	✓	✓		
Write Protect		✓		✓		✓		✓		

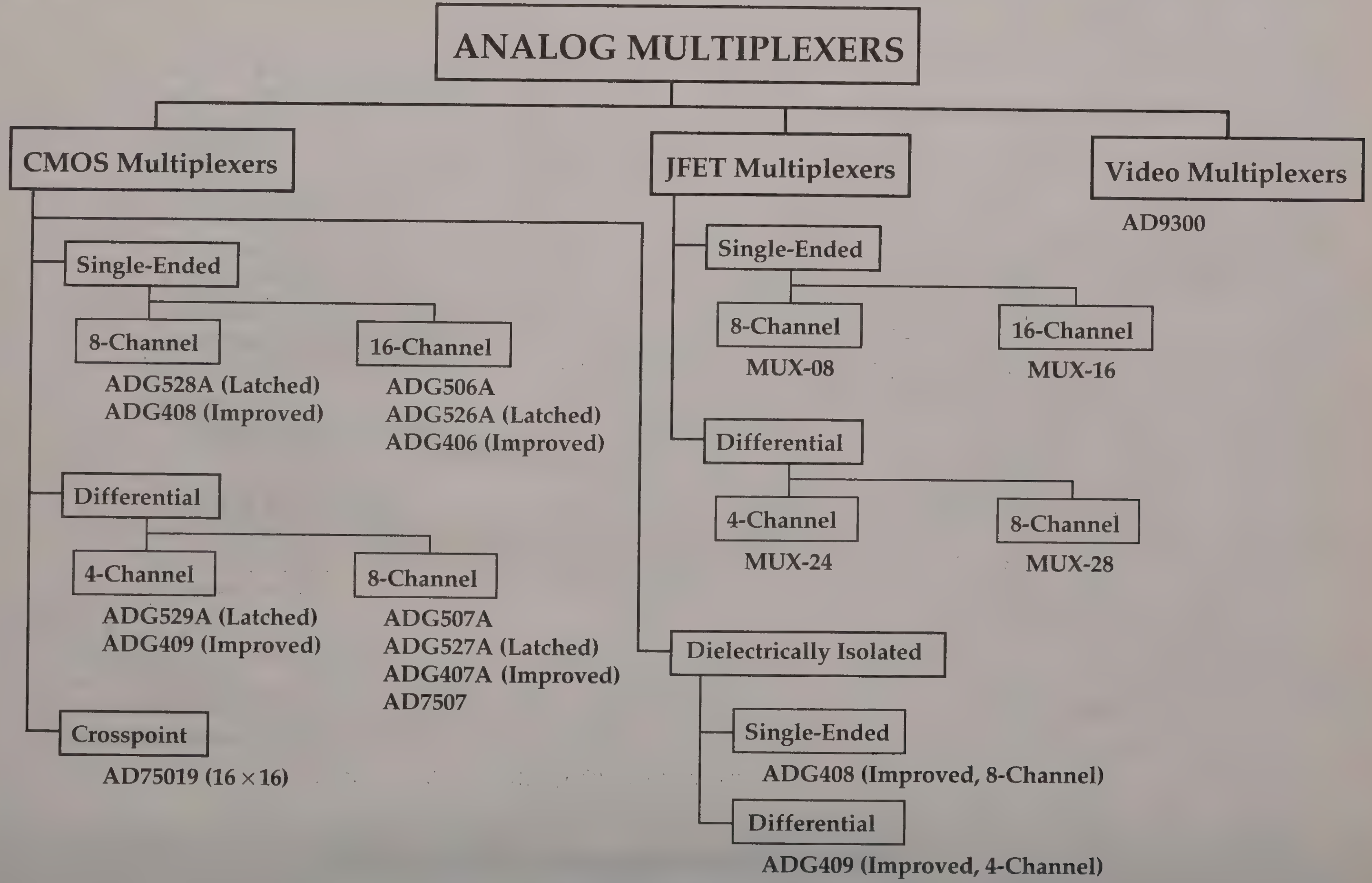
Motion Control Products—Selection Tree

MOTION CONTROL PRODUCTS

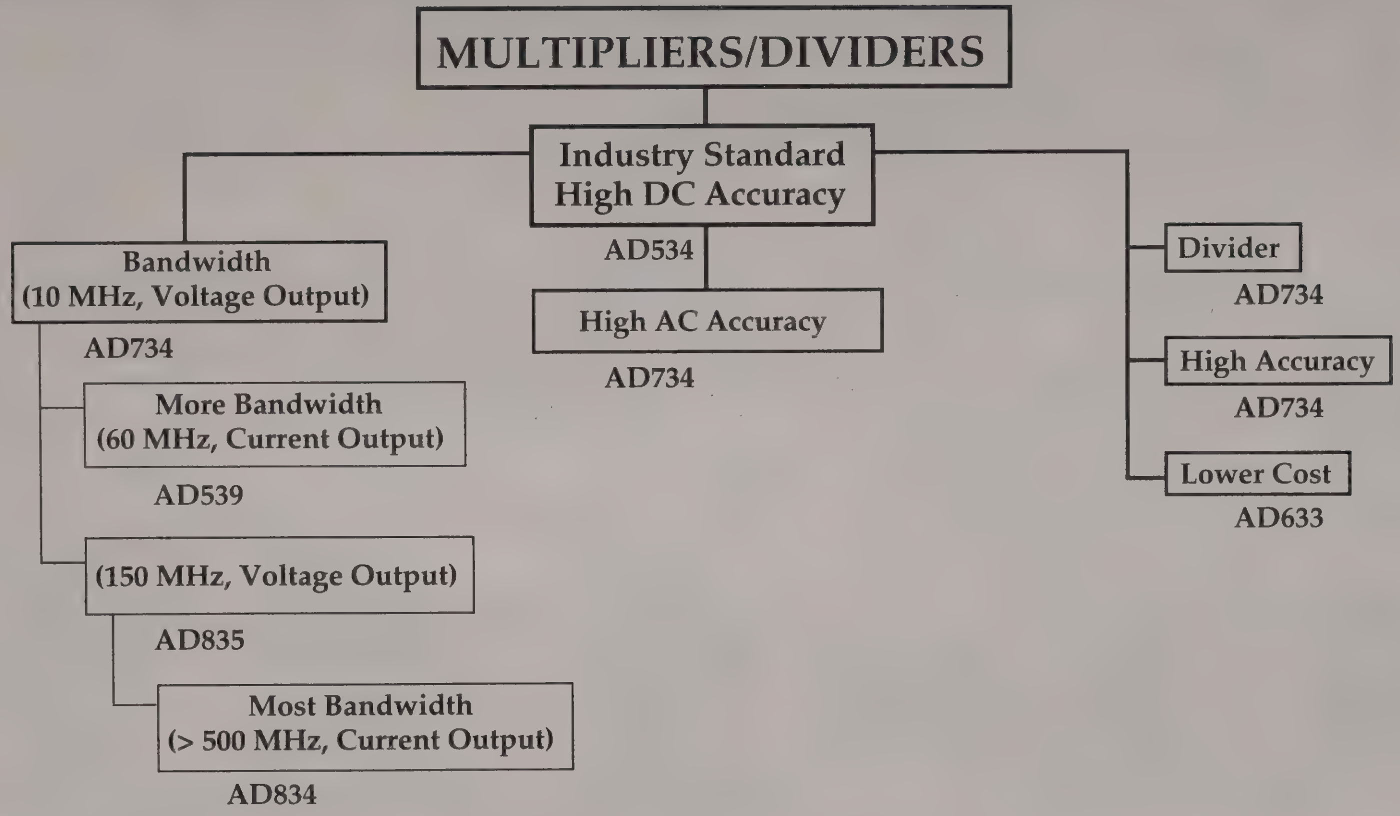
- **Position-to-Digital Converters**
  - **Resolver-to-Digital**
    - AD2S46 (16-Bit)
    - AD2S47 (16-Bit)
    - AD2S80A (10- to 16-Bit)
    - AD2S82A (10- to 16-Bit)
    - AD2S83 (10- to 16-Bit)
    - AD2S34 (Dual Channel, 14-Bit)
    - SDC/RDC1740 (14-Bit, Iso)
    - AD2S81A (12-Bit)
    - AD2S44 (Dual Channel, 12-Bit)
    - SDC/RDC1741 (12-Bit, Iso)
    - SDC/RDC1742 (12-Bit, Iso)
    - AD2S90 (12-Bit)
  - **LVDT-to-Digital**
    - 2S56 (16-Bit)
    - 2S58 (16-Bit)
    - 2S54 (14-Bit)
    - AD2S93 (Monolithic, 14-Bit)
    - 2S50 (11-Bit)
- **Digital-to-Resolver Converters**
  - **16-Bit**
    - DRC1746
    - AD2S66
  - **14-Bit**
    - DRC1745
    - AD2S65
  - **12-Bit**
    - AD2S100
- **Synchro/Resolver Support Components**
  - **Signal Conditioning**
    - AD2S75 (Sig & Ref Isolation)
    - IPA1764 (Inductosyn* Preamp)
  - **Reference Oscillators**
    - AD2S99 (Monolithic)
    - OSC1758 (Hybrid)
  - **Vector Transformation**
    - AD2S100

*Inductosyn is a registered trademark of Farrand Industries, Inc.

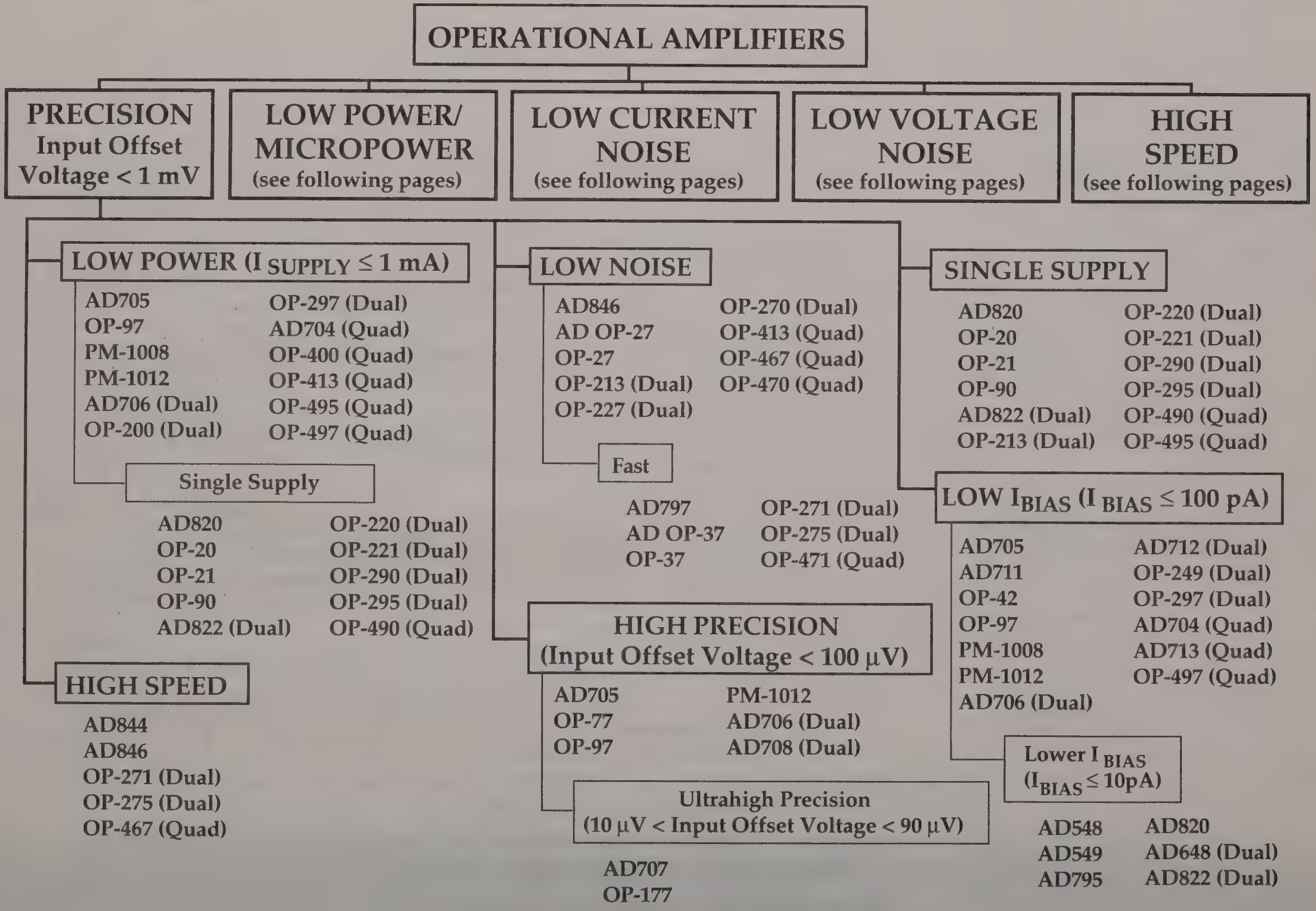
Multiplexers, Analog— Selection Tree


ANALOG MULTIPLEXERS
CMOS Multiplexers
JFET Multiplexers
Video Multiplexers
AD9300
Single-Ended
8-Channel
ADG528A (Latched)
ADG408 (Improved)
16-Channel
ADG506A
ADG526A (Latched)
ADG406 (Improved)
Differential
4-Channel
ADG529A (Latched)
ADG409 (Improved)
8-Channel
ADG507A
ADG527A (Latched)
ADG407A (Improved)
AD7507
Crosspoint
AD75019 (16 × 16)
Single-Ended
8-Channel
MUX-08
16-Channel
MUX-16
Differential
4-Channel
MUX-24
8-Channel
MUX-28
Dielectrically Isolated
Single-Ended
ADG408 (Improved, 8-Channel)
Differential
ADG409 (Improved, 4-Channel)

Multipliers/Dividers, Analog—Selection Tree

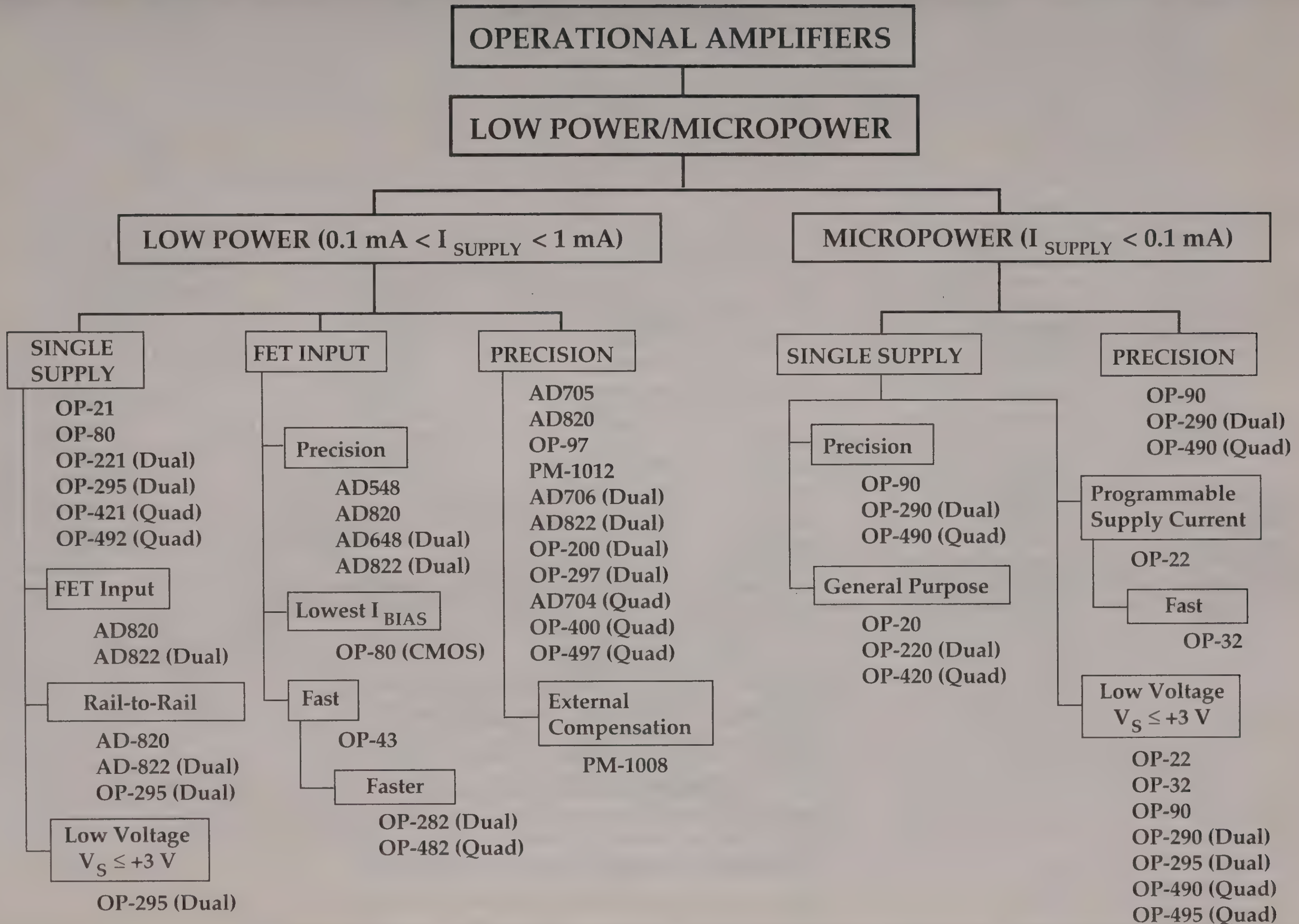

MULTIPLIERS/DIVIDERS
Industry Standard High DC Accuracy
AD534
High AC Accuracy
AD734
Bandwidth (10 MHz, Voltage Output)
AD734
More Bandwidth (60 MHz, Current Output)
AD539
(150 MHz, Voltage Output)
AD835
Most Bandwidth (> 500 MHz, Current Output)
AD834
Divider
AD734
High Accuracy
AD734
Lower Cost
AD633

Operational Amplifiers— Selection Trees



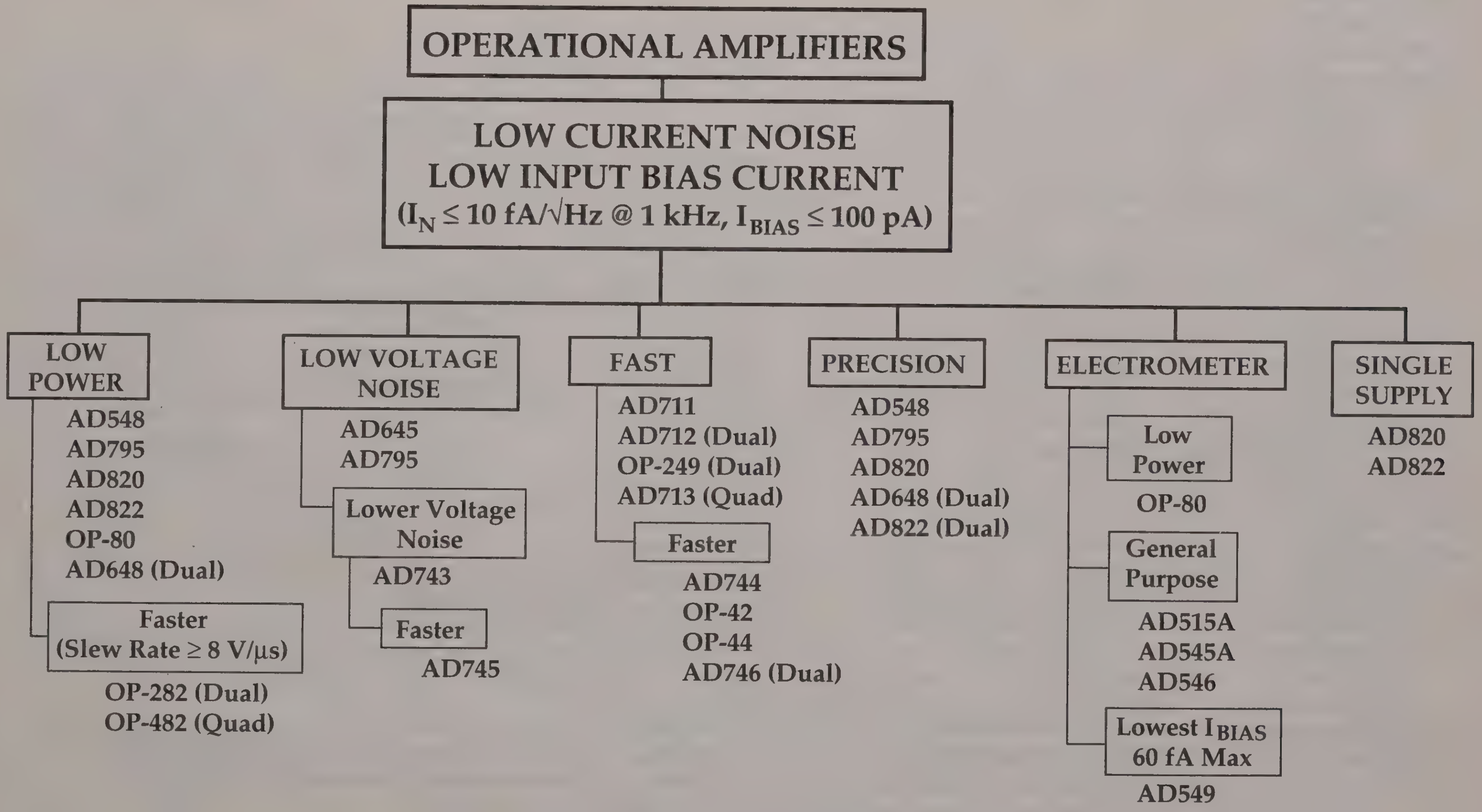
OPERATIONAL AMPLIFIERS

- PRECISION Input Offset Voltage < 1 mV
  - LOW POWER (I SUPPLY ≤ 1 mA)
    - AD705
    - OP-97
    - PM-1008
    - PM-1012
    - AD706 (Dual)
    - OP-200 (Dual)
    - OP-297 (Dual)
    - AD704 (Quad)
    - OP-400 (Quad)
    - OP-413 (Quad)
    - OP-495 (Quad)
    - OP-497 (Quad)
    - Single Supply
      - AD820
      - OP-20
      - OP-21
      - OP-90
      - AD822 (Dual)
      - OP-220 (Dual)
      - OP-221 (Dual)
      - OP-290 (Dual)
      - OP-295 (Dual)
      - OP-490 (Quad)
  - HIGH SPEED
    - AD844
    - AD846
    - OP-271 (Dual)
    - OP-275 (Dual)
    - OP-467 (Quad)
  - LOW NOISE
    - AD846
    - AD OP-27
    - OP-27
    - OP-213 (Dual)
    - OP-227 (Dual)
    - OP-270 (Dual)
    - OP-413 (Quad)
    - OP-467 (Quad)
    - OP-470 (Quad)
    - Fast
      - AD797
      - AD OP-37
      - OP-37
      - OP-271 (Dual)
      - OP-275 (Dual)
      - OP-471 (Quad)
  - HIGH PRECISION (Input Offset Voltage < 100 µV)
    - AD705
    - OP-77
    - OP-97
    - PM-1012
    - AD706 (Dual)
    - AD708 (Dual)
    - Ultrahigh Precision (10 µV < Input Offset Voltage < 90 µV)
      - AD707
      - OP-177
  - SINGLE SUPPLY
    - AD820
    - OP-20
    - OP-21
    - OP-90
    - AD822 (Dual)
    - OP-213 (Dual)
    - OP-220 (Dual)
    - OP-221 (Dual)
    - OP-290 (Dual)
    - OP-295 (Dual)
    - OP-490 (Quad)
    - OP-495 (Quad)
  - LOW I_{BIAS} ($I_{BIAS} \le 100$ pA)
    - AD705
    - AD711
    - OP-42
    - OP-97
    - PM-1008
    - PM-1012
    - AD706 (Dual)
    - AD712 (Dual)
    - OP-249 (Dual)
    - OP-297 (Dual)
    - AD704 (Quad)
    - AD713 (Quad)
    - OP-497 (Quad)
    - Lower I_{BIAS} ($I_{BIAS} \le 10$pA)
      - AD548
      - AD549
      - AD795
      - AD820
      - AD648 (Dual)
      - AD822 (Dual)
- LOW POWER/ MICROPOWER (see following pages)
- LOW CURRENT NOISE (see following pages)
- LOW VOLTAGE NOISE (see following pages)
- HIGH SPEED (see following pages)



- OPERATIONAL AMPLIFIERS
  - LOW POWER/MICROPOWER
    - LOW POWER (0.1 mA < I_{SUPPLY} < 1 mA)
      - SINGLE SUPPLY
        - OP-21
        - OP-80
        - OP-221 (Dual)
        - OP-295 (Dual)
        - OP-421 (Quad)
        - OP-492 (Quad)
        - FET Input
          - AD820
          - AD822 (Dual)
        - Rail-to-Rail
          - AD-820
          - AD-822 (Dual)
          - OP-295 (Dual)
        - Low Voltage $V_S \le +3$ V
          - OP-295 (Dual)
      - FET INPUT
        - Precision
          - AD548
          - AD820
          - AD648 (Dual)
          - AD822 (Dual)
        - Lowest I_{BIAS}
          - OP-80 (CMOS)
        - Fast
          - OP-43
          - Faster
            - OP-282 (Dual)
            - OP-482 (Quad)
      - PRECISION
        - AD705
        - AD820
        - OP-97
        - PM-1012
        - AD706 (Dual)
        - AD822 (Dual)
        - OP-200 (Dual)
        - OP-297 (Dual)
        - AD704 (Quad)
        - OP-400 (Quad)
        - OP-497 (Quad)
        - External Compensation
          - PM-1008
    - MICROPOWER (I_{SUPPLY} < 0.1 mA)
      - SINGLE SUPPLY
        - Precision
          - OP-90
          - OP-290 (Dual)
          - OP-490 (Quad)
        - General Purpose
          - OP-20
          - OP-220 (Dual)
          - OP-420 (Quad)
        - Programmable Supply Current
          - OP-22
          - Fast
            - OP-32
        - Low Voltage $V_S \le +3$ V
          - OP-22
          - OP-32
          - OP-90
          - OP-290 (Dual)
          - OP-295 (Dual)
          - OP-490 (Quad)
          - OP-495 (Quad)
      - PRECISION
        - OP-90
        - OP-290 (Dual)
        - OP-490 (Quad)

Operational Amplifiers—Selection Trees

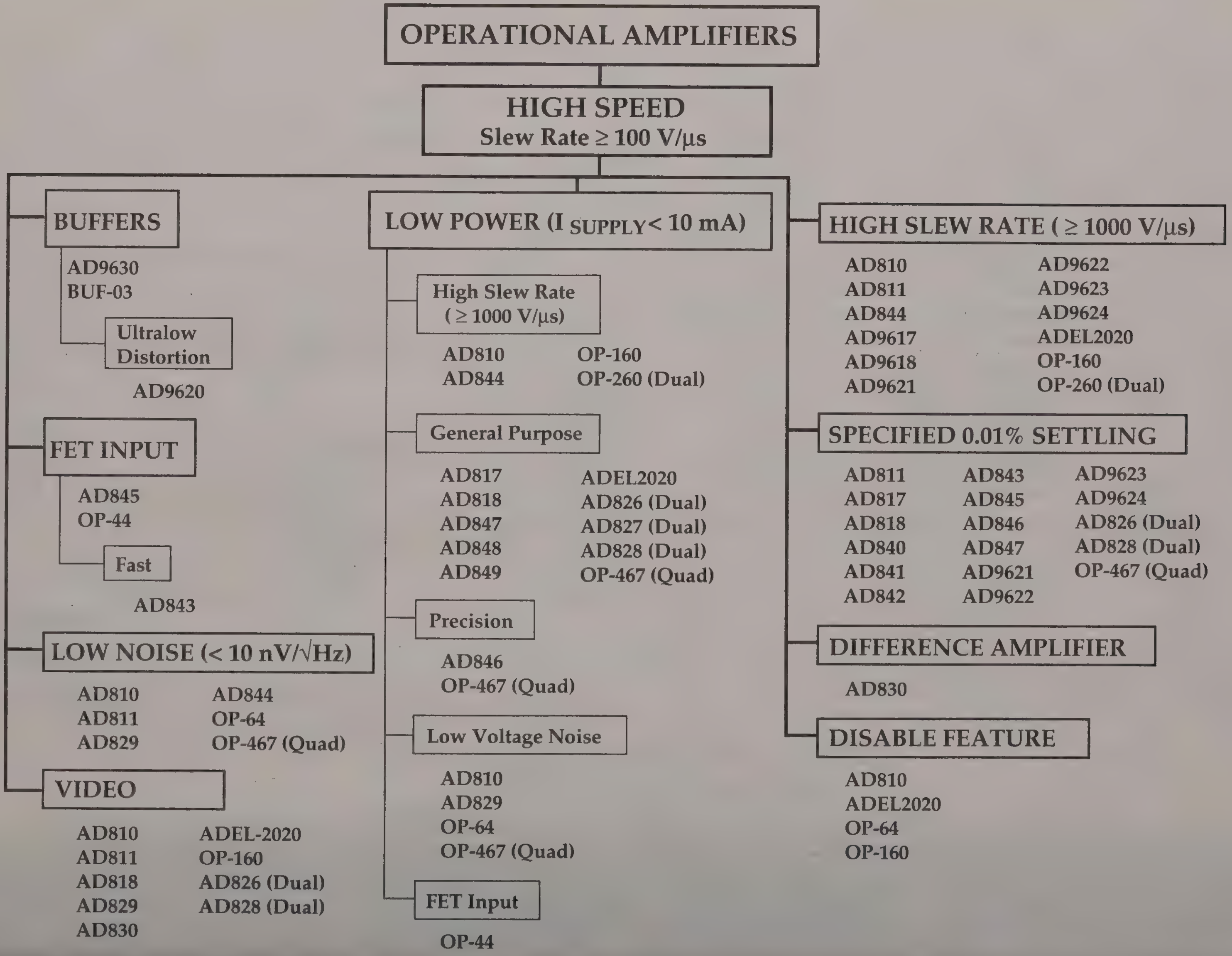

OPERATIONAL AMPLIFIERS
LOW CURRENT NOISE
LOW INPUT BIAS CURRENT
($I_N \leq 10$ fA/√Hz @ 1 kHz, $I_{BIAS} \leq 100$ pA)
LOW POWER
AD548
AD795
AD820
AD822
OP-80
AD648 (Dual)
Faster
(Slew Rate ≥ 8 V/μs)
OP-282 (Dual)
OP-482 (Quad)
LOW VOLTAGE NOISE
AD645
AD795
Lower Voltage Noise
AD743
Faster
AD745
FAST
AD711
AD712 (Dual)
OP-249 (Dual)
AD713 (Quad)
Faster
AD744
OP-42
OP-44
AD746 (Dual)
PRECISION
AD548
AD795
AD820
AD648 (Dual)
AD822 (Dual)
ELECTROMETER
Low Power
OP-80
General Purpose
AD515A
AD545A
AD546
Lowest I_{BIAS}
60 fA Max
AD549
SINGLE SUPPLY
AD820
AD822

OPERATIONAL AMPLIFIERS

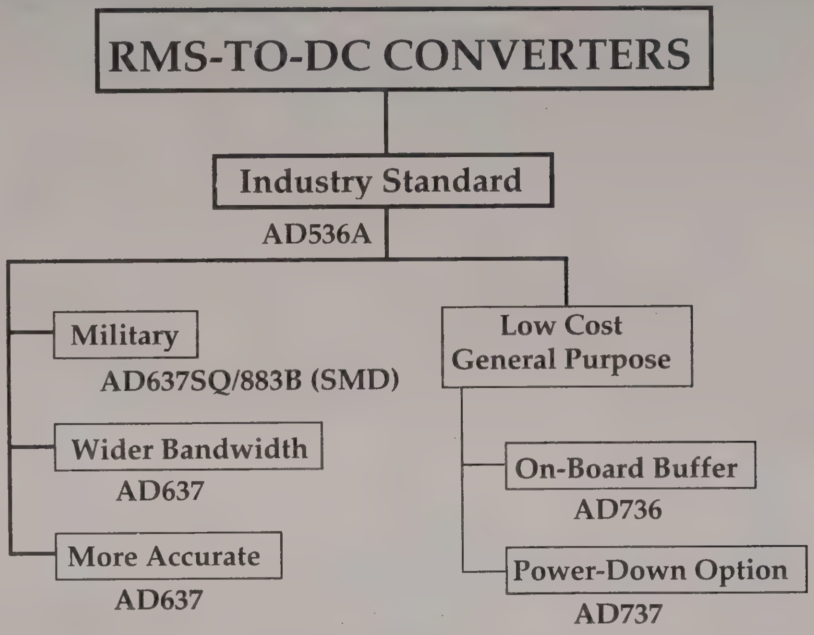
LOW VOLTAGE NOISE – V_N
($V_N \leq 10$ nV/√Hz @ 1 kHz)

- **ULTRALOW V_N (0.9 nV/√Hz)**
  - AD797
- **AUDIO AMPLIFIERS**
  - AD797
  - OP-275
  - SSM-2015
  - SSM-2016
  - SSM-2017
  - SSM-2134
  - SSM-2139
- **FAST (Slew Rate ≥ 45 V/μs)**
  - OP-61
  - OP-467 (Quad)
  - **Faster (Slew Rate ≥ 230 V/μs)**
    - AD829
    - AD840
    - AD844
    - AD846
    - AD848
    - AD849
    - AD5539
    - **Ultrafast (Slew Rate ≥ 1000 V/μs)**
      - AD810
      - AD811
      - AD844
      - AD9610
      - AD9617
      - AD9618
      - AD9621
      - AD9622
      - AD9623
      - AD9624
- **PRECISION**
  - AD797
  - AD OP-27
  - AD OP-37
  - OP-27
  - OP-37
  - OP-213
  - OP-227 (Dual)
  - OP-270 (Dual)
  - OP-271 (Dual)
  - OP-275 (Dual)
  - OP-467 (Quad)
  - OP-470 (Quad)
  - OP-471 (Quad)
  - **High Output Current**
    - AD797
    - OP-50
- **FET INPUT**
  - AD645
  - AD743
  - AD795
  - **Fast**
    - AD745

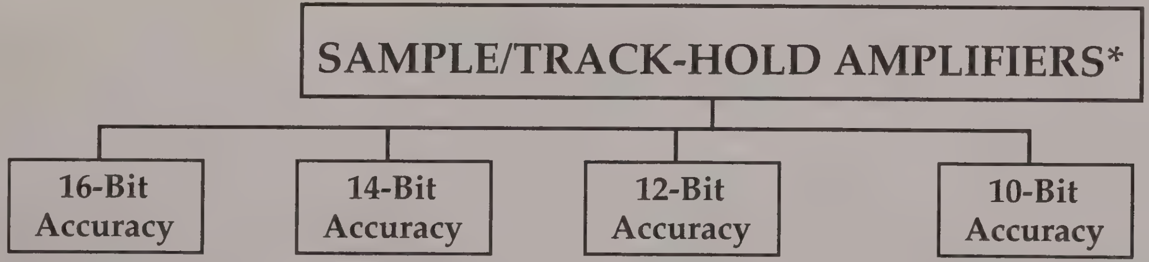
Operational Amplifiers—Selection Trees


OPERATIONAL AMPLIFIERS
HIGH SPEED
Slew Rate ≥ 100 V/µs
BUFFERS
AD9630
BUF-03
Ultralow Distortion
AD9620
FET INPUT
AD845
OP-44
Fast
AD843
LOW NOISE (< 10 nV/√Hz)
AD810
AD811
AD829
AD844
OP-64
OP-467 (Quad)
VIDEO
AD810
AD811
AD818
AD829
AD830
ADEL-2020
OP-160
AD826 (Dual)
AD828 (Dual)
LOW POWER (I SUPPLY< 10 mA)
High Slew Rate (≥ 1000 V/µs)
AD810
AD844
OP-160
OP-260 (Dual)
General Purpose
AD817
AD818
AD847
AD848
AD849
ADEL2020
AD826 (Dual)
AD827 (Dual)
AD828 (Dual)
OP-467 (Quad)
Precision
AD846
OP-467 (Quad)
Low Voltage Noise
AD810
AD829
OP-64
OP-467 (Quad)
FET Input
OP-44
HIGH SLEW RATE (≥ 1000 V/µs)
AD810
AD811
AD844
AD9617
AD9618
AD9621
AD9622
AD9623
AD9624
ADEL2020
OP-160
OP-260 (Dual)
SPECIFIED 0.01% SETTLING
AD811
AD817
AD818
AD840
AD841
AD842
AD843
AD845
AD846
AD847
AD9621
AD9622
AD9623
AD9624
AD826 (Dual)
AD828 (Dual)
OP-467 (Quad)
DIFFERENCE AMPLIFIER
AD830
DISABLE FEATURE
AD810
ADEL2020
OP-64
OP-160

RMS-to-DC Converters—Selection Tree


RMS-TO-DC CONVERTERS
Industry Standard
AD536A
Military
AD637SQ/883B (SMD)
Wider Bandwidth
AD637
More Accurate
AD637
Low Cost
General Purpose
On-Board Buffer
AD736
Power-Down Option
AD737

Sample/Track-Hold Amplifiers— Selection Tree


SAMPLE/TRACK-HOLD AMPLIFIERS*
16-Bit Accuracy
14-Bit Accuracy
12-Bit Accuracy
10-Bit Accuracy

16-Bit Accuracy

AD386 (4.1 μs)
AD1154 (5.0 μs)

14-Bit Accuracy

AD389 (2.5 μs)

12-Bit Accuracy

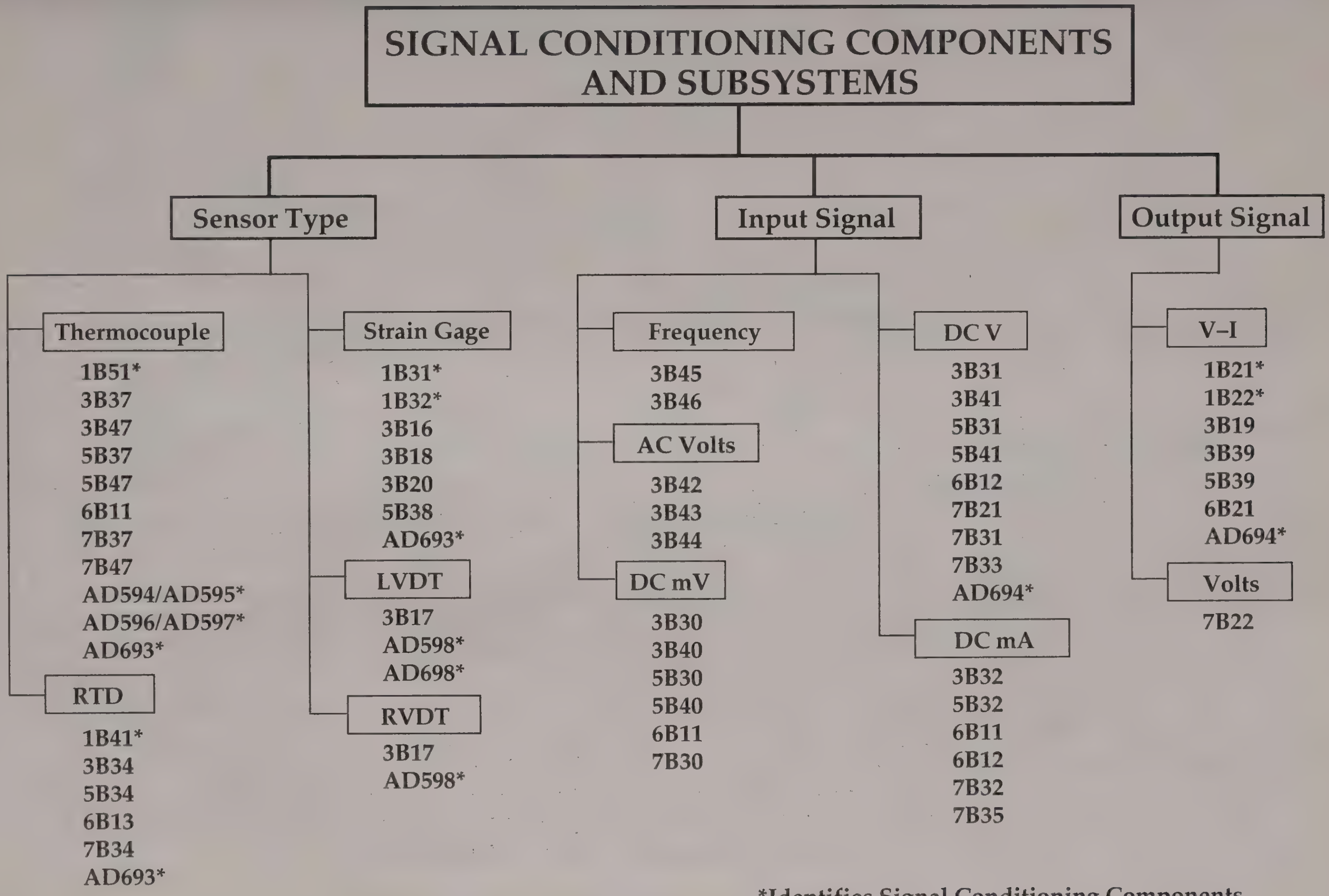
AD9101 (11 ns)
AD9100 (23 ns)
AD783 (375 ns)
AD781 (700 ns)
AD585 (3.0 μs)
SMP-10 (3.5 μs)
SMP-11 (3.5 μs)
AD684 (Quad/1.0 μs)
SMP-04 (Quad/7.0 μs)

10-Bit Accuracy

AD9101 (7 ns)
SMP-81 (3.5 μs)
SMP-18 (Octal/Mux Input/3.5 μs)
SMP-08 (Octal/Mux Input/7.0 μs)

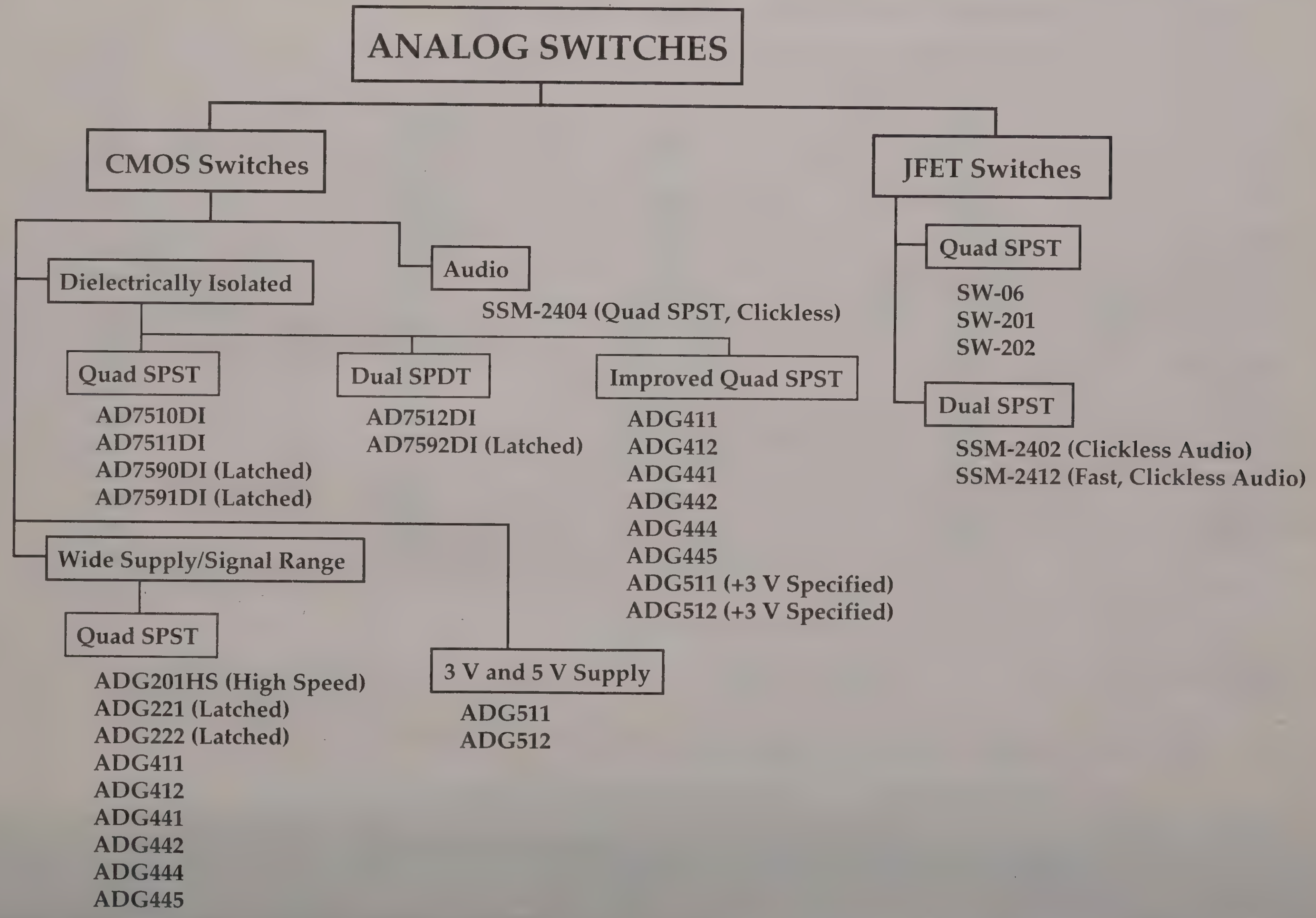
*Times noted are acquisition times to rated accuracy.

Signal Conditioning Components & Subsystems— Selection Tree

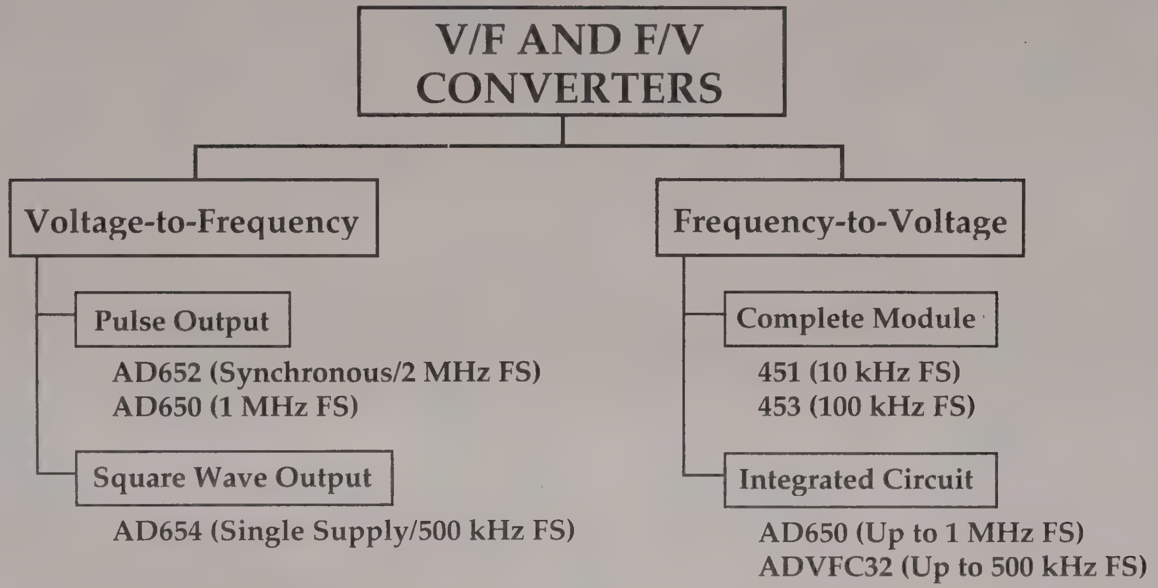

SIGNAL CONDITIONING COMPONENTS AND SUBSYSTEMS
Sensor Type
Thermocouple
1B51*
3B37
3B47
5B37
5B47
6B11
7B37
7B47
AD594/AD595*
AD596/AD597*
AD693*
RTD
1B41*
3B34
5B34
6B13
7B34
AD693*
Strain Gage
1B31*
1B32*
3B16
3B18
3B20
5B38
AD693*
LVDT
3B17
AD598*
AD698*
RVDT
3B17
AD598*
Input Signal
Frequency
3B45
3B46
AC Volts
3B42
3B43
3B44
DC mV
3B30
3B40
5B30
5B40
6B11
7B30
DC V
3B31
3B41
5B31
5B41
6B12
7B21
7B31
7B33
AD694*
DC mA
3B32
5B32
6B11
6B12
7B32
7B35
Output Signal
V–I
1B21*
1B22*
3B19
3B39
5B39
6B21
AD694*
Volts
7B22

*Identifies Signal Conditioning Components
(the remainder being Subsystem Modular Devices)

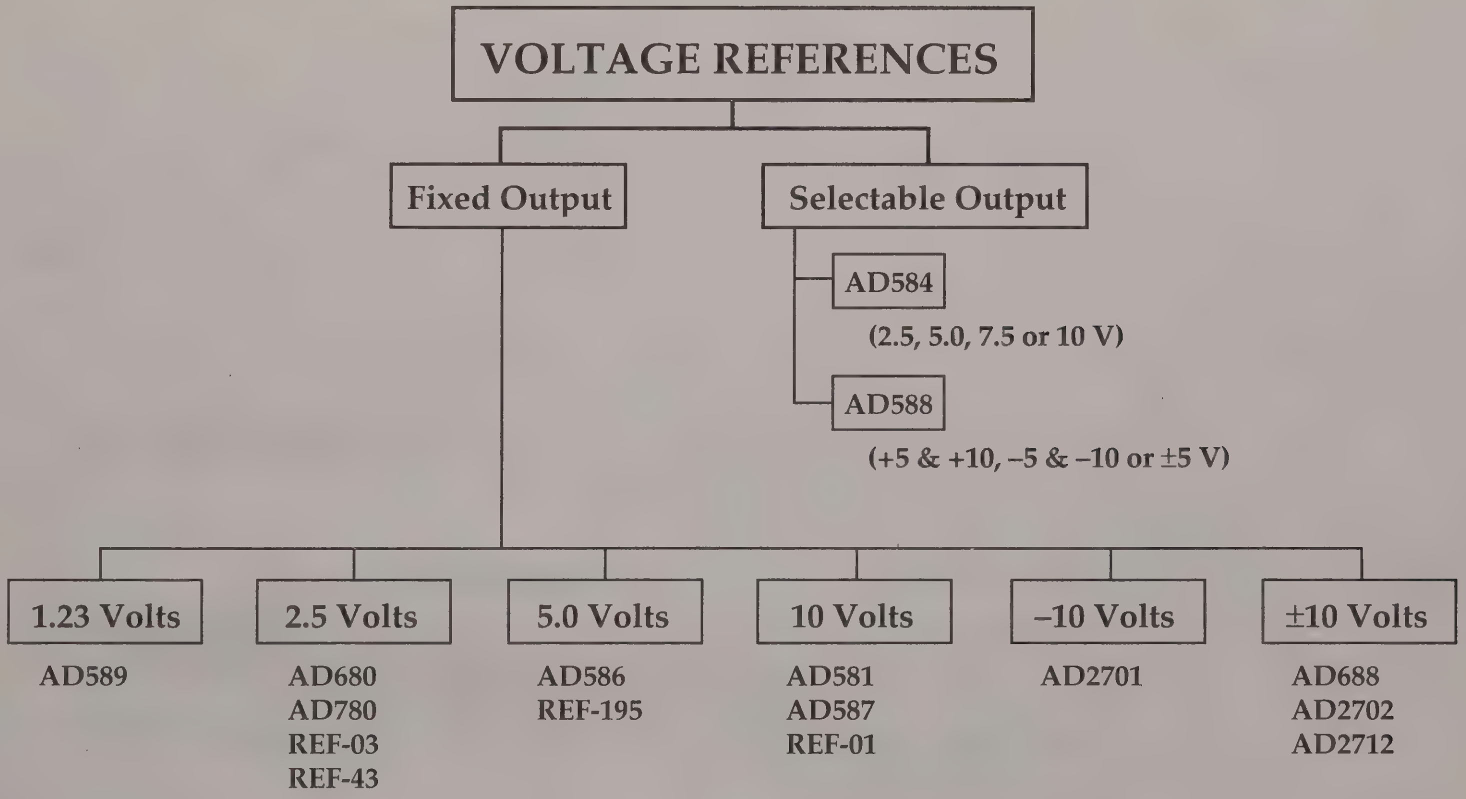
Switches, Analog—Selection Tree


ANALOG SWITCHES
CMOS Switches
JFET Switches
Dielectrically Isolated
Audio
SSM-2404 (Quad SPST, Clickless)
Quad SPST
AD7510DI
AD7511DI
AD7590DI (Latched)
AD7591DI (Latched)
Dual SPDT
AD7512DI
AD7592DI (Latched)
Improved Quad SPST
ADG411
ADG412
ADG441
ADG442
ADG444
ADG445
ADG511 (+3 V Specified)
ADG512 (+3 V Specified)
Wide Supply/Signal Range
Quad SPST
ADG201HS (High Speed)
ADG221 (Latched)
ADG222 (Latched)
ADG411
ADG412
ADG441
ADG442
ADG444
ADG445
3 V and 5 V Supply
ADG511
ADG512
Quad SPST
SW-06
SW-201
SW-202
Dual SPST
SSM-2402 (Clickless Audio)
SSM-2412 (Fast, Clickless Audio)

V/F and F/V Converters— Selection Tree


V/F AND F/V CONVERTERS
Voltage-to-Frequency
Pulse Output
AD652 (Synchronous/2 MHz FS)
AD650 (1 MHz FS)
Square Wave Output
AD654 (Single Supply/500 kHz FS)
Frequency-to-Voltage
Complete Module
451 (10 kHz FS)
453 (100 kHz FS)
Integrated Circuit
AD650 (Up to 1 MHz FS)
ADVFC32 (Up to 500 kHz FS)

Voltage References—Selection Tree


VOLTAGE REFERENCES
Fixed Output
Selectable Output
AD584
(2.5, 5.0, 7.5 or 10 V)
AD588
(+5 & +10, –5 & –10 or ±5 V)
1.23 Volts
AD589
2.5 Volts
AD680
AD780
REF-03
REF-43
5.0 Volts
AD586
REF-195
10 Volts
AD581
AD587
REF-01
–10 Volts
AD2701
±10 Volts
AD688
AD2702
AD2712

ATE Components—Selection Guides

Pin Drivers

Model	Speed MHz	V_{RANGE}	Slew Rate at 5 V (V/ns)	Output Capacitance pF	Linearity % of V_{REF}	Package Options	Temp Range
AD1324	200	−2 V to 7 V	1.8	3.5	0.15	Z	C
AD1320	40	−12 V to +12 V	0.5	20	0.5	Q	C

Comparators

Model	Prop Delay ns	Common-Mode Range	Dispersion ps	Input Capacitance pF typ	Input Offset mV max	Package Options	Temp Range
AD1317	2.5	−2 V to 7 V	250	2 (max)	±10	Z	C
AD96685	3.5	−2.5 V to 5 V	50	2	2	Q, E, P, H	I, $m/_{DS}$
AD96687‡	3.5	−2.5 V to 5 V	50	2	2	Q, E, P	I, $m/_{DS}$
AD9696	7.0	−2.2 V to 3.7 V	100	3	2	N, Q, R, H	C, $m/_{S}$
AD9698‡	7.0	−2.2 V to 3.7 V	100	3	2	N, Q, R	C, m/

Active Load

Model	Prop Delay ns	Program Current mA	Input Leakage nA	V_{OUT} Capacitance pF	Package Options	Temp Range
AD1315	1.5	±50	±200	2	Z	C

Delay Generators

Model	Description	Package Options	Temp
AD9500	ECL Digitally Programmable Delay Generator	Q, E, P	C, m/
AD9501	TTL/CMOS Digitally Programmable Delay Generator	N, Q, P	C, m/
AD9505	60 MHz "On the Fly" Programmable Delay Generator	P	C

Boldface Type: Product recommended for new design.
‡Dual Comparators.

ATE-Related Components—Selection Guides

Parametric Measurement Components

Model	Description	Package Options	Temp Range
AD676	**16-Bit, 10 µs Sampling ADC**	**D, N**	**C, I, M**
AD1376	16-Bit, 17 µs ADC	D	C
AD1377	16-Bit, 10 µs ADC	D	C
AD1380	**16-Bit, 20 µs Sampling ADC**	**D**	**C**
AD1382/AD1385	16-Bit, 2 µs Sampling ADC	D	C, M

Level-Setting Components

Model	Description	Package Options	Temp Range
AD664	**Quad 12-Bit DAC, V_{OUT} Reset, Readback**	**D, N, E, P**	**C, I, M/$_{D}$**
AD7228	Octal 8-Bit DAC, V_{OUT}	N, Q, E, P, R	C, I, M/
AD7244	**Dual 14-Bit DAC, V_{OUT}, Ref, Serial I/O**	**N, Q, R**	**C, I, M**
AD7568	**Octal 12-Bit DAC, I_{OUT}, Serial I/O**	**S**	**I**
AD75004	**Quad 12-Bit DAC, V_{OUT}, Reference**	**N, P**	**C**
AD75069	**Octal 12-Bit DAC, V_{OUT}, Readback, Ref**	**P, J**	**C, I**
DAC-8412	**Quad 12-Bit DAC, V_{OUT}, Reset to Midscale**	**D, N, E, P**	**I, M/**
DAC-8413	**Quad 12-Bit, DAC, V_{OUT}, Reset to Zero**	**D, N, E, P**	**I, M/**
SMP-08	**Octal Mux/SHA, 4 µs Acquisition Time**	**N, Q, R**	**I, M**
SMP-18	**Octal Mux/SHA, 2 µs Acquisition Time**	**N, Q, R**	**I**

Multiplexer

Model	Description	Package Option	Temp Range
AD75019	**16 × 16 Analog Crosspoint Switch**	**P**	**C, I**

Boldface Type: Product recommended for new design.

Comparators—Selection Guide

Model	Prop Delay ns max	Dispersion ps	Logic	V_{OS} mV max	Package Options	Temp Range	Comments
AD1317	2.5	250	ECL	10	Z	I, $M/_D$	Dedicated Window Comparator with Wide CM Range
AD96685	**3.5**	**50**	**ECL**	**2**	**Q, E, P, R, H**	**I, $M/_D$**	**Ultrafast**
AD96687	**3.5**	**50**	**ECL**	**2**	**Q, E, P, R**	**I, M/**	**Dual AD96685**
AD9696	**7.0**	**100**	**TTL**	**2**	**N, Q, R, H, Z**	**C, M/**	**Single Comparator**
AD9698	**7.0**	**100**	**TTL**	**2**	**Q, R, H, Z**	**C, M/**	**Dual Comparator**
AD790	**45**	**—**	**TTL**	**0.25–1**	**N, Q, R**	**C, I, $M/_D$**	**Fast, Precise Single or Dual Supply**
CMP-05	55	—	TTL	0.6	N, Q, R, H	I, M/	High Speed Precision Comparator
PM-111	180	—	TTL	3.0	D, N, E, R, H	I, $M/_J$	Fast, Wide Input Range, General Purpose
PM-211	180	—	TTL	3.0	D, N, E, R, H	I, M	Fast, Wide Input Range, General Purpose
CMP-01	180	—	TTL	0.8	N, Q, H	C, $M/_D$	Fast Precision Comparator
CMP-02	**270**	**—**	**TTL**	**0.8**	**N, Q, H**	**C, M**	**Low Input Current Precision Comparator**
CMP-04	300 typ	—	TTL	1.0	N, Q, R	I, $M/_D$	Quad Low Power Precision Comparator
PM-139	1300	—	TTL	2	D, N, E	I, $M/_{DJ}$	Low Power, Single or Dual Supply
PM-239	1300	—	TTL	2	D, N, E	I, M	Low Power, Single or Dual Supply

Data Acquisition Subsystems—Selection Guide

Model	Resolution Bits	Throughput Rate kHz	No. Channels	Bus Interface	Package Options	Temp Range	Comments
AD1341	**12**	**150**	**16/8**	**16**	**Z**	**C, M/**	**Complete, Programmable DAS with Fast Bus Interface**
AD1334	**12**	**65**	**4**	**12**	**D**	**I, M/**	**Four-Channel 12-Bit Sampling ADC, On-Chip FIFO**
AD364R	12	20	16/8	12	D	C, M	High Speed 16-Channel 12-Bit DAS
AD363R	12	25	16/8	12	D	C, M	16-Channel 12-Bit DAS
AD7850	**12**	**10**	**1**	**Serial**	**N, P**	**C**	**Small Signal DAS with Instrumentation Amplifiers and Reference**
AD7716	**20**	**0.30**	**1**	**Serial**	**N, R**	**C**	**Quad 20-Bit Sigma Delta ADC, Low Power**

Boldface Type: Product recommended for new design.

Mass Storage Components—Selection Guides

Optical Storage Component

Model	Description	Package Options	Temp
AD880	Optical Disk Drive Data/Servo Channel Processor	R	C

Magnetic Read/Write Channel Components

Model	Description	Package Options	Temp
AD890	Precision, Wideband Channel Processing Element	Q, P	C
AD891	Rigid Disk Data Channel Qualifier	Q, P	C
AD891A	50 Mb/s Rigid Disk Data Qualifier	P	C
AD892T/E	30 Mb/s Peak Detector	P	C
AD896	Programmable Filter	N, R	C
AD897	40 Mb/s Peak Detector and Data Synchronizer	N, S	C
AD899	32 Mb/s Read-Channel Electronics	R	C

Mass Storage Servo Components

Model	Description	Package Options	Temp
AD7569	Complete, 8-Bit Analog I/O Port with DAC, ADC, SHA, Amps, and Reference	N, Q, E, P	C, I, M/$_D$
AD7669	Complete, 8-Bit Analog I/O Port with 2 DACs, ADC, SHA, Amps, and Reference	N, P	C, I, M
AD7769	8-Bit Analog I/O Port with Two-Channel ADC/DAC	N, P	C

Boldface Type: Product recommended for new design.

Signal Compression Components—Selection Guide

Model	Input Range	Log Conformity RTI	BW kHz	Package Options	Temp Range	Comments
755	1 nA–1 mA	0.5%	10	Module	I	Complete, Current and Voltage, 6 Decade, High Accuracy
759	20 nA–0.2 mA	1.0%	200	Module	I	Complete, Current and Voltage, 4 Decade, Lowest Cost
AD640	**0.75 mV–200 mV**	**±0.6 dB**	**120 MHz**	**D, N, E, P**	**C, I, M/$_{DS}$**	**120 MHz, 45 dB, DC Demodulating Logarithmic Amplifier**
AD600	**±2 V**	**±0.5 dB**	**30 MHz**	**N, R**	**C, I, M/**	**Dual 0 to +40 dB Variable Gain Amplifier**
AD602	**±2 V**	**±0.5 dB**	**30 MHz**	**N, R**	**C, I, M/**	**Dual −10 dB to +30 dB Variable Gain Amplifier**
AD603	**±2 V**	**±0.4 dB**	**100 MHz**	**N, R**	**I, M**	**Single Channel Variable Gain Amplifier**
AD606	**−80 to +10 dBm (50 Ω)**	**±1 dB**	**50 MHz**	**N, R**	**C**	**50 MHz, 80 dB Demodulating Logarithmic Amplifier with Limiter Output**

Special Function Components—Selection Guide

Model	Description	Package Options	Temp Range
AD639	Universal Trigonometric Function Converter	D	I, M/
PKD-01	**Monolithic Peak Detector with Reset-and-Hold Mode**	**N, Q**	**C, M/**
ADXL-50	**Monolithic Accelerometer with Signal Conditioning**	**D, H**	**M**
AD730	**Programmable Clock Generator**	**R**	**C**
AD720	**RGB to NTSC/PAL Encoder**	**P**	**C**
AD9560	**High Speed Monolithic Pulse Width Modulator**	**N, R**	**C**

Boldface Type: Product recommended for new design.

Temperature Sensors—Selection Guide

Model	I_{OUT} µA/K	V_{OUT} mV/K	Cal Error °C max	Nonlin °C max	Package Options	Temp Range	Comments
AC2626	**1**	**—**	**0.5–5**	**0.3–1.5 Steel Sheath**	**3/16″ Stainless**	**C, M**	**General Purpose Temperature Probe 4″ and 6″ Length**
AD590	**1**	**—**	**0.5–5**	**0.3–1.5**	**H, F**	**M+/$_{DS}$**	**Wide Temperature Range, Accurate**
AD592	**1**	**—**	**0.5–2.5**	**0.15–0.35**	**N**	**I+**	**Low Cost, Accurate**
TMP-01	**—**	**5**	**1.2–6**	**0.4–1.0**	**N, Q, R, H, Y**	**I, M+**	**Complete Programmable Temperature Controller**

Transistors, Matched—Selection Guide

Model	Type	V_{OS} Max µV	TCV_{OS} Max µV/°C	hFE Min[1]	ΔhFE max %	en max $nV/\sqrt{Hz}$[2]	Package Options	Temp Range	Comments
MAT-01	Dual NPN	100	0.5	500	3	7.5	Q	M/	Low Cost
MAT-02	Dual NPN	50	0.1	500	2	1	N	I, M/	Low Noise, Low r_{BE}
MAT-03	Dual PNP	100	0.5	100	2	1	N	I, M/	Low Noise
MAT-04	Quad NPN	200	1	300	2	2.5	N	I, M/	Low Cost
SSM-2210	Dual NPN	200	1	300	5	1	P	I	Low Cost, Audio
SSM-2220	Dual PNP	200	1	80	6	1	R	I	Low Cost, Audio

[1] $I_C = 1$ mA
[2] $f_C \geq 100$ Hz
Boldface Type: Product recommended for new design.

HIGH POWER, HIGH VOLTAGE, HIGH SPEED
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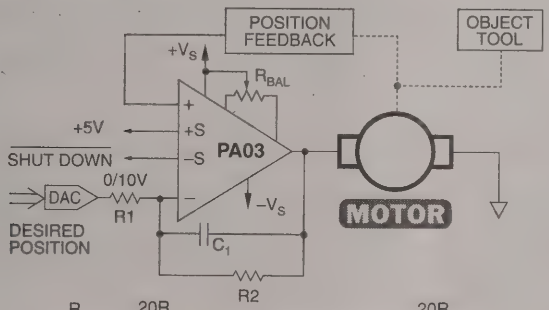
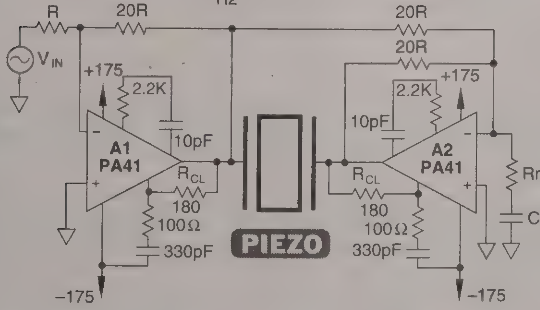
All products manufactured by APEX MICROTECHNOLOGY are warranted to be free of defects when operated within the published specified operating conditions for the life of the equipment in which the APEX component is originally installed. The warranty applies to the original customer who purchased the component from APEX, or the first system buyer of the original equipment from an APEX customer. (See current Pricing & Ordering data sheet for warranty information.)

TYPICAL APPLICATIONS

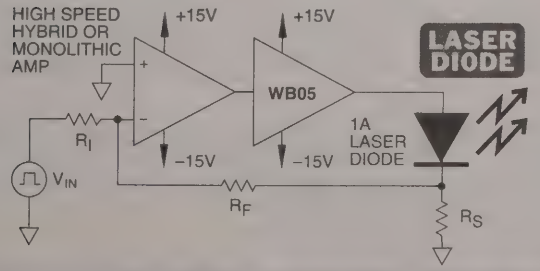
HIGH POWER


POSITION FEEDBACK
OBJECT TOOL
+V_S
R_BAL
+
+5V
+S
SHUT DOWN
–S
PA03
0/10V
DAC
R1
–
–V_S
MOTOR
DESIRED POSITION
C_1
R2

HIGH VOLTAGE

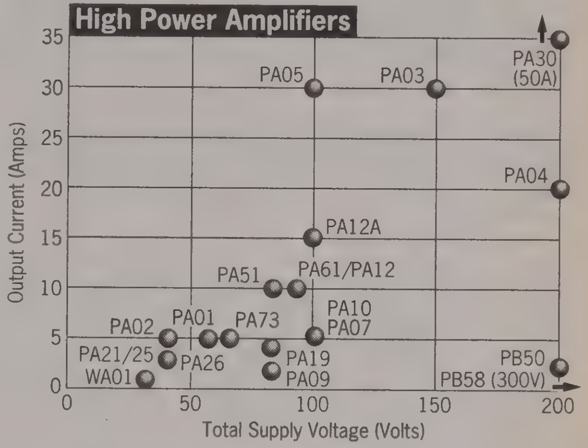

R
20R
20R
20R
V_IN
+175
2.2K
10pF
A1
PA41
R_CL
180
100Ω
330pF
–175
PIEZO
+175
2.2K
10pF
A2
PA41
R_CL
180
100Ω
330pF
Rn
Cn
–175

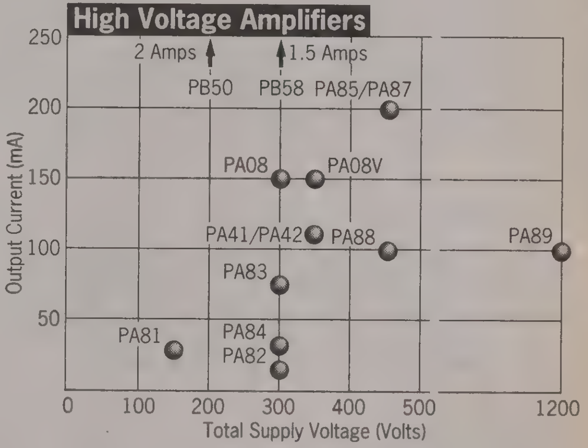
HIGH SPEED

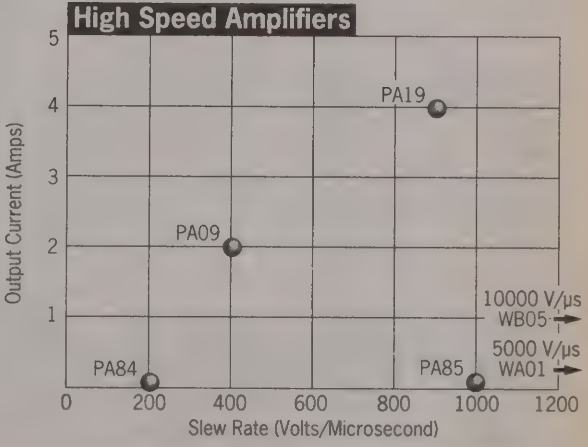

HIGH SPEED HYBRID OR MONOLITHIC AMP
+15V
+15V
WB05
LASER DIODE
1A LASER DIODE
R_I
V_IN
–15V
–15V
R_F
R_S

PRODUCT DEFINITIONS

HIGH POWER AMPLIFIER: **$I_{OUT} > \pm 1.0A$**
HIGH VOLTAGE AMPLIFER: **$V_S > \pm 50V$**
HIGH SPEED AMPLIFIER: **Slew Rate > 400V/µs**







Apex Microtechnology

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Temperature Sensors—Selection Guide

Model	I_{OUT} µA/K	V_{OUT} mV/K	Cal Error °C max	Nonlin °C max	Package Options	Temp Range	Comments
AC2626	**1**	**—**	**0.5–5**	**0.3–1.5 Steel Sheath**	**3/16″ Stainless**	**C, M**	**General Purpose Temperature Probe 4″ and 6″ Length**
AD590	**1**	**—**	**0.5–5**	**0.3–1.5**	**H, F**	**M+/$_{DS}$**	**Wide Temperature Range, Accurate**
AD592	**1**	**—**	**0.5–2.5**	**0.15–0.35**	**N**	**I+**	**Low Cost, Accurate**
TMP-01	**—**	**5**	**1.2–6**	**0.4–1.0**	**N, Q, R, H, Y**	**I, M+**	**Complete Programmable Temperature Controller**

Transistors, Matched—Selection Guide

Model	Type	V_{OS} Max µV	TCV_{OS} Max µV/°C	hFE Min[1]	ΔhFE max %	en max $nV/\sqrt{Hz}$[2]	Package Options	Temp Range	Comments
MAT-01	Dual NPN	100	0.5	500	3	7.5	Q	M/	Low Cost
MAT-02	Dual NPN	50	0.1	500	2	1	N	I, M/	Low Noise, Low r_{BE}
MAT-03	Dual PNP	100	0.5	100	2	1	N	I, M/	Low Noise
MAT-04	Quad NPN	200	1	300	2	2.5	N	I, M/	Low Cost
SSM-2210	Dual NPN	200	1	300	5	1	P	I	Low Cost, Audio
SSM-2220	Dual PNP	200	1	80	6	1	R	I	Low Cost, Audio

[1] $I_C = 1$ mA
[2] $f_C \geq 100$ Hz
Boldface Type: Product recommended for new design.

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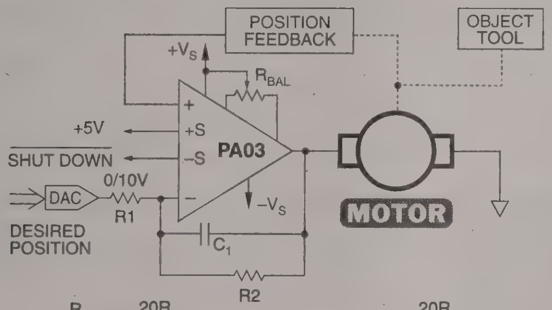
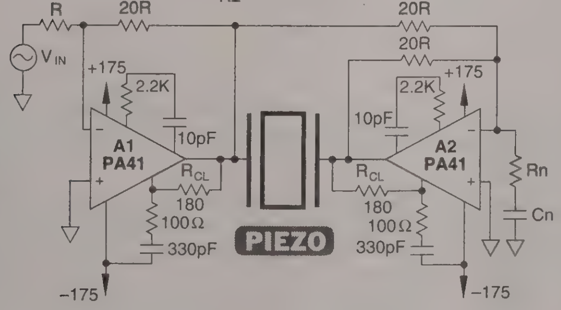
TYPICAL APPLICATIONS

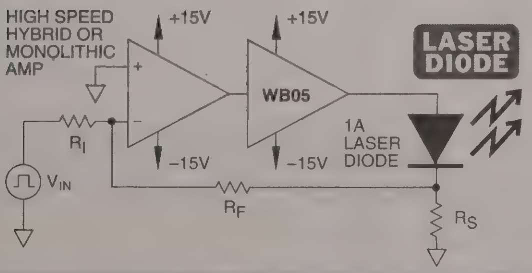
HIGH POWER


POSITION FEEDBACK
OBJECT TOOL
+V_S
R_BAL
+5V
+S
SHUT DOWN
–S
PA03
0/10V
DAC
R1
–V_S
DESIRED POSITION
C_1
R2
MOTOR

HIGH VOLTAGE

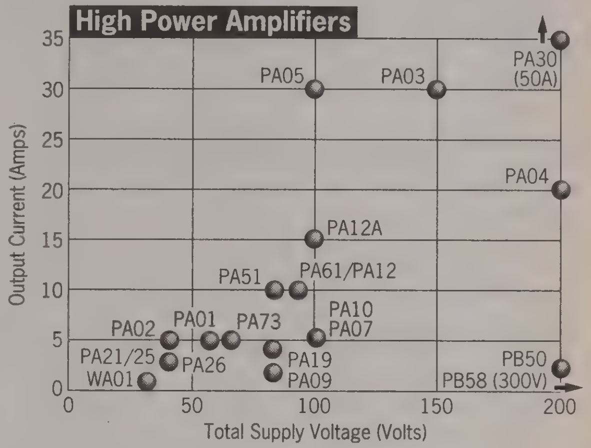

R
20R
20R
20R
V_IN
+175
2.2K
10pF
A1
PA41
R_CL
180
100Ω
330pF
PIEZO
+175
2.2K
10pF
A2
PA41
R_CL
180
100Ω
330pF
Rn
Cn
–175
–175

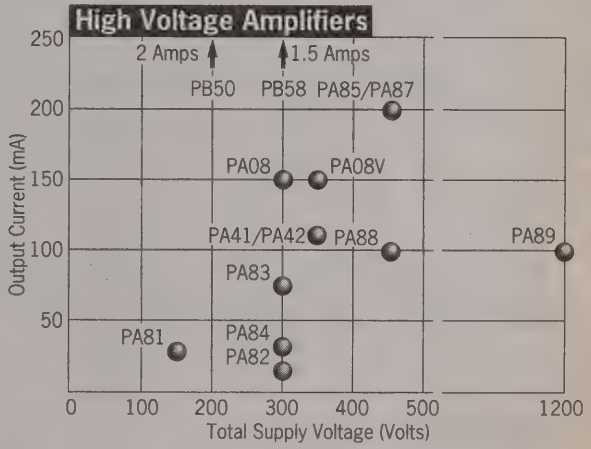
HIGH SPEED

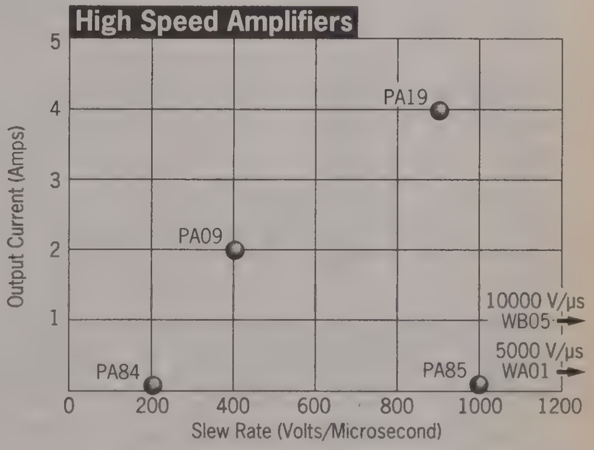

HIGH SPEED HYBRID OR MONOLITHIC AMP
+15V
+15V
LASER DIODE
WB05
1A LASER DIODE
R_I
V_IN
–15V
–15V
R_F
R_S

PRODUCT DEFINITIONS

HIGH POWER AMPLIFIER: $I_{OUT} > \pm1.0A$
HIGH VOLTAGE AMPLIFER: $V_S > \pm50V$
HIGH SPEED AMPLIFIER: **Slew Rate > 400V/µs**







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HIGH VOLTAGE

Model	±Supply Range Volts Min/Max	Output Current (Cont.) mA, Min	Saturation @I_OMax (V_S-V_O) Volts, Max	Internal Power Watts Max	Slew Rate V/µs Typ	V_{OS} Initial mV Max	V_{OS} vs Temp µV/°C Max	Bias Current nA Max	I_q mA Max	Gain BW Product MHz Typ	Current Limit (Amps)	Thermal Shutdown	Temp Range °C Min/Max	Packaging Type
PA89	50/600	75	30	40	16	2	30	.05	6	10	Ext Adj	No	–25/85	MO-127
PA89A	*	*	*	*	*	.5	10	.01	*	*	*	*	*	*
PA85	15/225	200	10	35	1000	2	30	.05	25	100	Ext Adj	No	–25/85	TO-3
PA85A	*	*	*	*	*	.5	10	.01	*	*	*	*	*	*
PA85M	*	*	*	*	400	4	30	.05	*	*	*	*	–55/125	*
PA87	50/225	200	15	7.5	20	10	50	2	3.0	3.1	Ext Adj	No	–25/85	SIP10
PA87A	*	*	*	*	35	3	25	*	*	*	*	*	*	*
PA88	15/225	100	10	15	30	2	30	.05	2	2	Ext Adj	No	–25/85	TO-3
PA88A	*	*	*	*	*	.5	10	.01	*	*	*	*	*	*
PA88M	*	*	*	*	15	4	30	.05	*	*	*	*	*	*
PA41	50/175	120	16	12	40	60	130	.05	2	1.6	Ext Adj	No	–25/85	TO-3
PA41A	*	*	14	*	*	30	65	*	1.8	*	*	*	*	*
PA41M	*	*	16	*	5	60	130	*	2	*	*	*	–55/125	*
PA42	50/175	120	16	9	40	60	130	2	2	1.6	Ext Adj	No	–25/85	SIP10
PA42A	*	*	14	*	*	30	*	*	1.8	*	*	*	*	*
PA08V	15/175	150	15	17.5	30	2	30	.05	8.5	5	Ext Adj	Yes	–25/85	TO-3
PA08	15/150	*	*	*	*	*	*	*	*	*	*	*	*	*
PA08A	*	*	*	*	*	.5	10	.01	*	*	*	*	*	*
PA08M/883	*	*	*	*	*	2	30	.05	*	*	*	*	–55/125	*
PB58	15/150	1500	11	80	100	1750	7000	—	12	2.5	Ext Adj	No	–25/85	TO-3
PB58A	*	2000	*	*	*	1000	*	—	*	*	*	*	*	*
PA83	15/150	75	10	17.5	30	3	25	.05	8.5	5	(.1)	Yes	–25/85	TO-3
PA83A	*	*	*	*	*	1	10	.01	*	*	*	*	*	*
PA83M/883	*	*	*	*	*	3	25	.05	*	*	*	*	–55/125	*
PA84	15/150	40	7	17.5	200	3	25	.05	7.5	76	(.05)	Yes	–25/85	TO-3
PA84A	*	*	*	*	*	1	10	.01	*	*	*	*	*	*
PA84M/883	*	*	*	*	*	3	25	.05	*	*	*	*	–55/125	*
PA84S	*	*	*	*	*	*	*	*	*	*	*	*	–25/85	*
PA82J	70/150	15	5	11.5	20	3	25	.05	8.5	5	(.025)	Yes	0/70	TO-3
PB50	30/100	2000	11	35	100	1750	7000	—	18	2.5	Ext Adj	No	–25/85	TO-3
PA81J	32/75	30	5	11.5	20	3	25	.05	8.5	5	(.05)	Yes	0/70	TO-3

†Specifications apply for T_C = 25°C, unless otherwise stated. *Specification is same as above.

HIGH SPEED

Model	Slew Rate V/µs Typ	Output Current (Cont.) Amps., Min	±Supply Range Volts Min/Max	Saturation @I_OMax (V_S-V_O) Volts, Max	Internal Power Watts Max	V_{OS} Initial mV Max	V_{OS} vs Temp µV/°C Max	Bias Current nA Max	I_q mA Max	Gain BW Product MHz Typ	Current Limit (Amps)	Thermal Shutdown	Temp Range °C Min/Max	Packaging Type
WA01	5000	.4	12/16	4	10.5	10	50	20000	30	—	(.6)	No	–25/85	TO-3
WA01A	*	*	*	*	*	5	25	10000	*	*	*	*	*	*
WB05	10000	1	5/15	6.5	15	100	500	30000	30	250	(1.5)	No	–25/85	TO-3
PA85	1000	.2	15/225	10	35	2	30	.05	25	100	Ext Adj	No	–25/85	TO-3
PA85A	*	*	*	*	*	.5	10	.01	*	*	*	*	*	*
PA85M	*	*	*	*	*	2	30	.05	*	*	*	*	–55/125	*
PA19	900	4	15/40	5	78	3	30	.2	120	100	Ext Adj	Yes	–25/85	TO-3
PA19A	*	*	*	*	*	.5	10	.05	*	*	*	*	*	*
PA09	400	2	12/40	8	78	3	30	.1	85	150	(4.5)	Yes	–25/85	TO-3
PA09A	*	*	*	*	*	.5	10	.02	*	*	*	*	*	*
PA09M/883	*	*	*	*	*	3	30	.1	*	*	*	*	–55/125	*

†Specifications apply for T_C = 25°C, unless otherwise stated. *Specification is same as above.

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HIGH POWER/DESC SMD AVAILABILITY

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HIGH POWER

Model	Internal Power Watts Max	Output Current (Cont.) Amps., Min	±Supply Range Volts Min/Max	Saturation @I_OMax (V_S-V_O) Volts, Max	Slew Rate V/µs Typ	V_{OS} Initial mV Max	V_{OS} vs Temp µV/°C Max	Bias Current nA Max	I_q mA Max	Gain BW Product MHz Typ	Current Limit (Amps)	Thermal Shutdown	Temp Range °C Min/Max	Packaging Type
PA30	1000	50	15/100	7.5/9.5(1)	45	10	50	.05	40	1	Ext Adj	Yes	–25/85	SL15
PA03	500	30	15/75	7	8	2	30	.05	300	1	Thermal	Yes	–25/85	MO-127
PA03A	*	*	*	*	*	.5	10	.01	*	*	*	*	*	*
PA04	200	20	15/100	5.3/8.8(1)	50	10	50	.05	90	2	Ext Adj	No	–25/85	MO-127
PA04A	*	*	*	*	*	5	30	.02	*	*	*	*	*	
PA05	250	30	15/50	5.8/9.5(1)	100	10	50	.05	120	3	Ext Adj	Yes	-25/85	MO-127
PA05A	*	*	*	*	*	5	30	.02	*	*	*	*	*	*
PA12	125	10	10/45	6	4	6	65	30	50	4	Ext Adj	No	–25/85	TO-3
PA12A	*	15	10/50	7	*	3	40	20	*	*	*	*	–55/125	*
PA12M/883	*	*	10/45	6	*	6	65	30	*	*	*	*	*	*
PA12H		1	*	4		6		30	100		*	*	–25/200	*
PA61(2)	97	10	10/45	7	2.8	6	65	30	10	1	Ext Adj	No	–25/85	TO-3
PA61A(2)	*	*	*	6	*	3	40	20	*	*	*	*	*	*
PA61M/883(2)	*	*	*	7	*	6	65	30	*	*	*	*	–55/125	*
PA51(2)	97	10	10/36	8	2.6	10	65	40	10	1	Ext Adj	No	–25/85	TO-3
PA51A(2)	*	*	10/40	*	*	5	40	20	*	*	*	*	*	*
PA51M/883(2)	*	*	10/36	*	*	10	65	40	*	*	*	*	*	*
PA07	67	5	12/50	5	5	2	30	.05	30	1.3	Ext Adj	Yes	–25/85	TO-3
PA07A	*	*	*	*	*	.5	10	.01	*	*	*	*	*	*
PA07M/883	*	*	*	*	*	2	30	.05	*	*	*	*	–55/125	*
PA10	67	5	10/45	8	5	6	65	30	30	6	Ext Adj	No	–25/85	TO-3
PA10A	*	*	10/50	6	*	3	40	20	*	*	*	*	–55/125	*
PA10M/883	*	*	10/45	8	*	6	65	30	*	*	*	*	*	*
PA73(2)	67	5	10/30	8	2.6	10	65	40	5	1	Ext Adj	No	–25/85	TO-3
PA73M/883(2)	*	*	*	*	*	*	*	*	*	*	*	*	–55/125	*
PA01	67	5	10/28	10	2.6	12	65	50	50	1	Ext Adj	No	–25/85	TO-3
PA02	48	5	7/19	4	20	10	50	.2	37	4.5	Ext Adj	No	–25/85	TO-3
PA02A	*	*	*	*	*	3	25	.1	*	*	*	*	–55/125	*
PA02M/883	*	*	*	*	*	3	50	.2	37	*	*	*	–55/125	*
PA21	36	2.5	2.5/20	3.0	1.2	10	15 typ	1000	90	.6	(3)	Yes	–25/85	TO-3
PA21A	*	3.0	*	3.5	*	4	10 typ	250	*	*	(4)	*	*	*
PA21M	*	2.5	*	3.0	*	10	15 typ	1000	*	*	(3)	*	–55/125	*
PA25	36	2.5	2.5/20	3.0	1.2	10	15 typ	1000	90	.6	(3)	Yes	–25/85	TO-3
PA25A	*	3.0	*	3.5	*	4	10 typ	25	*	*	(4)	*	*	*
PA26	36	2.5	2.5/20	3.0	1.2	10	15 typ	1000	90	.6	(3)	Yes	–25/85	SIP12
PB50	35	2	30/100	11	100	1750	7000	—	18	2.5	Ext Adj	No	–25/85	TO-3
PB58	80	1.5	15/150	11	100	1500	7000	—	12	2.5	Ext Adj	No	–25/85	TO-3
PB58A	*	2.0	*	*	*	1000	*	—	*	*	*	*	*	*

†Specifications apply for T_C = 25°C, unless otherwise stated. *Specification is same as above.

(1) 1st number with Boost Voltage = V_S + 5V; 2nd number without Boost Voltage (2) Class "C" output—optimized for low cost—not recommended above 1KHz

DESC SMD AVAILABILITY

Apex Model Number	SMD Part #
High Power	
PA02M/883	5962-9067901HXX
PA07M/883	5962-9063801HXX
PA10M/883	5962-9082801HXX
PA12M/883	5962-9065901HXX
PA51M/883	5962-8762002YX

Apex Model Number	SMD Part #
High Voltage	
PA08M/883	5962-9072301HXX
PA83M/883	5962-9162101HXX
PA84M/883	5962-9073601HXX
High Speed	
PA09M/883	5962-9170001HXX

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- ✓ Founded in 1956.
- ✓ Corporate headquarters: Tucson, Arizona, USA.
- ✓ 1404 employees.
- ✓ Manufacturing and technical facilities: Tucson; Livingston, Scotland; Atsugi, Japan.
- ✓ Sales and distribution subsidiaries in Austria, France, Germany, Italy, Japan, the Netherlands, Switzerland; and the United Kingdom; 12 international sales representative organizations worldwide.
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Operational Amplifiers

SPECIAL PURPOSE OPERATIONAL AMPLIFIERS

Boldface = NEW

Description	Model	Offset Voltage, max: At 25°C, (±mV)	Offset Voltage, max: Temp Drift, (±µV/°C)	Bias Current (25°C), max (µA)	Open Loop Gain, min (dB)	Frequency Response: Unity Gain (MHz)	Frequency Response: Slew Rate (V/µs)	Rated Output, min: (±V)	Rated Output, min: (±mA)	Temp Range[1]	Pkg
Two-Channel	OPA675	1	5	35	65	185[2]	350	2.1	30	Com, Mil	DIP
	OPA676	1	5	35	65	185[2]	350	2.1	30	Com, Mil	DIP
	OPA678	1.5	20	50	50	200	350	2.5	30	Com, Mil	DIP, SOIC
Voltage Controlled Gain	**VCA610**	**—**	**—**	**6[3]**	**[4]**	**30[5]**	**60**	**3.0[6]**	**80[7]**	**Ind**	**DIP, SOIC**

NOTES: (1) Com = 0°C to +70°C, Mil = –55°C to +125°C. (2) –3dB BW at Gain of +10V/V. (3) Typical. (4) C/L Gain range: –40 to +40dB. (5) Gain = 40dB. (6) Vp-p typ. (7) Short circuit current.

LOW DRIFT OPERATIONAL AMPLIFIERS

Boldface = NEW

Description	Model	Offset Voltage, max: At 25°C, (±mV)	Offset Voltage, max: Temp Drift, (±µV/°C)	Bias Current (25°C), max (nA)	Open Loop Gain, min (dB)	Frequency Response: Unity Gain (MHz)	Frequency Response: Slew Rate[3] (V/µs)	Rated Output, min: (±V)	Rated Output, min: (±mA)	Temp Range[1]	Pkg
FET	OPA627	0.1	0.8	.005	112	16	55	11.5	45[3]	Ind	TO-99, DIP, SOIC
	OPA637	0.1	0.8	.005	112	80	135	11.5	45[3]	Ind	TO-99, DIP, SOIC
	OPA111	0.25	1	±0.001	120	2	2	11	5.5	Ind	TO-99
	OPA124	**0.25**	**2**	**±0.001**	**120**	**1.5**	**1**	**11**	**5.5**	**Ind**	**DIP, SOIC**
	OPA671	5.0	10[3]	.05	74	35	107	10.5	50	Ind	DIP
Wideband	OPA602	0.25	2	±.001	92	6.5	35	11.5	15	Ind	TO-99, DIP, SOIC
	OPA606	0.5	5	±0.01	100	13	35	12	5	Com	TO-99, DIP
	OPA671	5.0	10[3]	.05	74	35	107	10.5	50	Ind	DIP
Dual FET	OPA2111	0.5	2.8	±0.004	114	2	2	10	5	Ind, Mil	TO-99, DIP
	OPA2107	0.5	5	.005	84	4.5	18	11	5.5	Ind	TO-99, DIP, SOIC
Low Power (Dual) Single Supply Operation	OPA1013	0.15	2	20	120	0.6	.35	13	6.5	Com	DIP
Bipolar	OPA177	0.01	0.1	1.5	134	0.6	0.3	12	12	Ind	DIP, SOIC
	OPA77	0.025	0.3	2.0	134	0.6	0.3	12	12	Ind	DIP
	OPA27	0.025	0.6	±40	120	8	1.9	12	16.7	Mil, Com	TO-99, DIP, SOIC
	OPA37	0.025	0.6	±40	120	63[2]	11.9	12	16.7	Mil, Com	TO-99, DIP, SOIC

NOTES: (1) Com = 0°C to +70°C, Ind = –25°C to +85°C, Mil = –55°C to +125°C. (2) Gain BW Product at G = 5. (3) Typical. (4) Gain BW Product at G = 10.

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WIDE BANDWIDTH OPERATIONAL AMPLIFIERS (Continued)

Boldface = NEW

		Frequency Response						Offset Voltage, max				
Description	Model	Gain BW (MHz)	Slew Rate min (V/µs)	t_s ±0.1% (ns)	Comp	Rated Output, min (±V)	Rated Output, min (±mA)	At 25°C (±mV)	Temp Drift (±µV/°C)	Open Loop Gain, min (dB)	Temp Range(1)	Pkg
Dual Transconductance Amp	OPA2662	370	2000(2)	2.6(5)	NA	3.4	75	12(2)	35	580(6)	XInd	DIP, SOIC
Quad FET	OPA404	6.4	28	600	int	11.5	5	0.75	3(2)	92	Ind	DIP, SOIC
Low Noise Bipolar	OPA27	8,A=1	1.7	—	int	12	16.7	0.025	0.6	120	Mil	TO-99, DIP
	OPA37	63,A=5	11	—	int(3)	12	16.7	0.025	0.6	120	Mil	TO-99, DIP
Low Distortion	**OPA628**	**160**	**310(2)**	**20**	**int**	**3**	**30**	**1**	**6(2)**	**90**	**XInd**	**DIP, SOIC**
	OPA642	**450**	**380**	**11.5**	**int**	**2.5**	**35**	**1.0**	**2.0 typ**	**95(2)**	**XInd, Mil**	**DIP, SOIC**
	OPA643	**1.5GHz A=5**	**1000**	**11.5**	**int**	**2.2**	**35**	**1.5**	**3 typ**	**95(2)**	**XInd, Mil**	**DIP, SOIC**
Very Wideband Low Noise	**OPA640**	**1.3GHz**	**350**	**18**	**int**	**2.2**	**25**	**2.0**	**6 typ**	**57(2)**	**XInd, Mil**	**DIP, SOIC**
	OPA641	**1.6GHz A=2**	**650**	**18**	**int**	**2.2**	**25**	**2.0**	**6 typ**	**57(2)**	**XInd, Mil**	**DIP, SOIC**
Low Power	**OPA646**	**650**	**180**	**11**	**int**	**2.0**	**25**	**2.5**	**12**	**51(2)**	**XInd, Mil**	**DIP, SOIC**
Low Noise Wideband	OPA620	300	175	10	int	3	150(2)	0.5	8(2)	55	Ind, Mil	DIP, SOIC
	OPA621	500, A=10	350	15	int	3	150(2)	0.5	12(2)	55	Ind, Mil	DIP,
High Slew Rate	OPA622	250	1600(2)	17	NA	3	70	0.1(2)	210(2)	50	XInd	DIP, SOIC
Fast Settling	OPA600	5000, A=1000	500	80	ext	9	180	4	40	86	Ind	DIP
Very Fast Settling Switched Input	OPA675	3000, A=16	240	15	ext	2.1	30(2)	1	5	65	Com, Mil	DIP
	OPA676	3000, A=16	240	15	ext	2.1	30(2)	1	5	65	Com, Mil	DIP
	OPA678	200 A=1	350(2)	15	ext	2.5	40(2)	1	5	50	Ind, Mil	DIP, SOIC
Low Cost	OPA27	8, A=1	1.7	—	int	12	16.7	0.100	1.8	117	Com	DIP, SOIC
	OPA37	63, A=5	11	—	int(3)	12	16.7	0.100	1.8	117	Com	DIP, SOIC
Voltage Controlled Gain	**VCA610**	**30**	**60**	**—**	**int**	**3**	**80**	**—**	**—**	**C/L**	**Ind**	**DIP, SOIC**

NOTES: (1) Com = 0°C to +70°C, Ind = –25°C to +85°C, XInd = –40°C to +85°C, Mil = –55°C to +125°C. (2) Typical. (3) G = 5 min. (4) Typical G ≥ 50. (5) Rise time, 10% to 90%. (6) Current output, mA/ns. (7) Transconductance, mA/V. (8) Open-loop transimpedance.

Instrumentation Amplifiers

INSTRUMENTATION AMPLIFIERS

Boldface = NEW

							Input Parameters				
Description	Model	Gain Range	Gain Accuracy, G=100 25°C, max(%)	Gain Drift, G=100 (ppm/°C)	Non-Linearity G=100 max(%)	CMR(5) min(dB)	Offset Voltage vs Temp max(μV/°C)	Dynamic Response, G=100 –3dB BW (kHz)	Temp Range(1)	Pkg
Very High Accuracy	**INA114**	**1-10,000(2)**	**0.5**	**25**	**±0.002**	**96**	**±(0.25+5/G)**	**10**	**Ind**	**DIP, SOIC**
	INA115	**1-10,000(2)**	**0.5**	**25**	**±0.002**	**96**	**±(0.25+5/G)**	**10**	**Ind**	**SOIC**
	INA131	**100**	**0.024**	**10**	**±0.002**	**110**	**±0.25**	**50**	**Ind**	**DIP, SOIC**
	INA120	1, 10, 100, 1000	0.5	30	±0.01	96	±(0.25±10/G)	20	Ind	DIP
	INA104	1-1000(2)	0.15	22(3)	±0.003	96	±(0.25±10/G)	25	Ind	DIP
	INA101	1-1000(2)	0.03	22(3)	±0.003	96	±(0.25±10/G)	25	Ind, Mil	DIP
		1-1000(2)	0.3	22(3)	±0.007	90	±(2±20/G) typ	25	Com	TO-100, DIP SOIC
Low Quiescent Power	**INA118**	**1-10,000**	**0.5**	**25**	**±0.002**	**96**	**±(0.5 + 5/G)**	**100**	**Ind**	**DIP, SOIC**
	INA102	1,10,100, 1000	0.15	15	±0.02	90	±(2±5/G)	3	Com, Ind	DIP, SOIC
Low Noise, Low Distortion	INA103	1-1000(2)	0.1	25	±0.004	100	±(0.5+10/G) typ	800	Ind	DIP
		1-1000(2)	0.25	25	±0.010	90	±(0.5+20/G) typ	800	Com	DIP, SOIC
Fast Settling FET Input	INA110	1,10,100, 200,500	0.1	20	±0.01	96	±(2±50/G)	470	Ind	DIP, SOIC
	INA111	1-10,000(2)	0.5	25	±0.01	96	±(5+100/G)	450	Ind	DIP, SOIC
Unity-Gain Difference Amp	INA105	1V/V,fixed	0.01(3)	5	±0.001(3)	86(4)	10	1000(3)	Ind	TO-99, DIP SOIC
	3627	1V/V,fixed	0.01(3)	5	±0.001(3)	100	20	800(3)	Ind	TO-99
Gain of 10 Diff. Amp	INA106	10V/V,fixed	0.01	10	±0.001	100(4)	2	500	Ind	DIP, SOIC
High Com. Mode Volt. Diff. Amp (200VDC CMV)	INA117	1V/V,fixed	0.02	10	±0.001	86(4)	20	200(3)	Ind	TO-99, DIP
4-20mA Loop Receiver	RCV420	4-20mA in 0 - 5V Out	0.05	25	±0.002	86	25(6)	150	Com, Ind	DIP

NOTES: (1) Com = 0°C to +70°C, Ind = –25°C to +85°C, Mil = –55°C to +125°C. (2) Set with external resistor. (3) Unity-gain. (4) No source imbalance. (5) DC to 60Hz, Gain = 10, (or specified gain of device). (6) RTO.

DIGITALLY PROGRAMMABLE GAIN AMPLIFIERS

Boldface = NEW

Description	Model	Digitally Selected Gains	Gain Accuracy, G=100 25°C, max(%)	Gain Drift, G=100 (ppm/°C)	Non-Linearity G=100 max(%)	Input Parameters		Dynamic Response, G=100 ±3dB BW (kHz)	Temp Range(1)	Pkg
						CMR min (dB)	Offset Voltage vs Temp max (µV/°C)			
Noninverting Amplifier	PGA100	1, 2, 4... to 128	0.02	10	±0.005	NA	6 typ	5MHz	Ind	DIP
	PGA102	1, 10, 100	0.01	20	±0.01	NA	3,G=100	250	Com, Ind	DIP
	PGA103	**1, 10, 100**	**0.1**	**20**	**±0.01**	**NA**	**2 typ**	**250**	**Ind**	**DIP,SOIC**
Instrumentation Amplifier Input	PGA200	1, 10, 100, 1000	0.02	10	±0.003	96	0.4,G=100	30	Ind	DIP
Fast Settling 2µs to 0.01%	PGA202	1, 10, 100, 1000	0.15	5	±0.012	86	±(3+25/G)	1000	Ind, Com	DIP
	PGA203	1, 2, 4, 8	0.15	5	±0.012	86	±(3+25/G)	1000	Ind, Com	DIP
Low Cost	**PGA204**	**1, 10, 100, 1000**	**0.024**	**10**	**±0.002**	**96**	**±(0.25 + 5/G)**	**10**	**Ind**	**DIP, SOL-16**
	PGA205	**1, 2, 4, 8**	**0.024**	**10**	**±0.002**	**96**	**±(0.25 + 5/G)**	**100**	**Ind**	**DIP, SOL-16**
	3606	1, 2, 4, 8 to 1024	0.02	10	±0.004	90,G=1	±(1+20/G)	40	Ind	DIP

NOTES: (1) Com = 0°C to +70°C, Ind = –25°C to +85°C.

4-20mA CURRENT TRANSMITTERS

Boldface = NEW

Description	Model	Span			Input Parameters			Output Parameters			Temp Range(1)	Pkg
		Untrimmed Error, max (%)	Non-linearity, max (%)	Temp Drift (ppm/°C)	Offset Voltage max	Offset Voltage vs Temp max (µV/°C)	CMR, DC, min (dB)	Current Range (mA)	Offset Current Error, max (µA)	FS Output Current Error, max (µA)		
Two-Wire	XTR101	5	0.01	±100	±30µV	±0.75	90	4-20	±6	±30	Ind	DIP SOIC
Two-Wire RTD Linearity Compensation	**XTR103**	**1**	**0.01**	**±50**	**±2500**	**±2.5**	**86**	**4-20**	**±25**	**50**	**Ind(2)**	**DIP SOIC**
Two-Wire Bridge Linearity Compensation	**XTR104**	**1**	**0.01**	**±50**	**±2500**	**±2.5**	**86**	**4-20**	**±25**	**±50**	**Ind(2)**	**DIP SOIC**
Three-Wire and Current Source	XTR110	0.2	0.005	30	—	—	—	4-20, 0-20, 5-25	±16	±32	Ind	DIP, SOIC

NOTES: (1) Com = 0°C to +70°C, Ind = –25°C to +85°C. (2) –40°C to +85°C.

PRECISION CURRENT TRANSMITTERS

Boldface = NEW

Two-Wire	**IXR100**	**See Isolation Products**

Isolation Products

OPTICALLY-COUPLED ISOLATION AMPLIFIERS

Boldface = NEW

		Isolation Voltage (V)		Isolation Mode Rejection, typ		Leakage Current at Test Voltage	Iso Impedance		Gain Nonlinearity		Voltage Drift	Bias Current	±3dB Freq	Ext Iso Power	
Descrip	Model	Cont Peak	Pulse Test, Peak	DC (dB)	60Hz (dB)	(µA)	(Ω)	(pF)	max (%)	typ (%)	(±µV/°C) max	max	(kHz)	Req	Temp[1]
Balanced Current Input	3650	2000	5000	140	120	0.35[2]	10^{12}	1.8	±0.05	±0.02	5	40nA	15	Yes	Ind
Balanced	3652	2000	5000	140	120	0.35[2]	10^{12}	1.8	±0.1	±0.05	25	50pA	15	Yes	Ind
Low Drift Wide BW	ISO100	750	2500	146[3]	108[3]	0.3[2]	10^{12}	2.5	0.07	0.02	2.5[3]	10nA	60	Yes	Ind

NOTES: All packages are DIPs. (1) Ind = –25°C to +85°C. (2) At 240V/60Hz. (3) R_{IN} = 10kΩ.

CAPACITOR-COUPLED ISOLATION AMPLIFIERS

Boldface = NEW

		Isolation Voltage (V)		Isolation Mode Rejection, typ		Leakage Current at Test Voltage	Iso Impedance		Gain Nonlinearity		Voltage Drift	Bias Current	±3dB Freq	Ext Iso Power	
Descrip	Model	Cont Peak	Pulse Test, Peak	DC (dB)	60Hz (dB)	(µA)	(Ω)	(pF)	max (%)	typ (%)	(±µV/°C) max	max	(kHz)	Req	Temp[1]
1500VAC Isolation	ISO102	2121	4000	160	120	1.0	10^{14}	6	±0.003	±0.002	±250	—	70	Yes	Ind[3]
	ISO120	2121	2500[2]	160	115	0.5	10^{14}	2	±0.01	±0.005	±150	—	60	Yes	Ind[3]
	ISO122	2121	2400[2]	160	140	0.5	10^{14}	2	±0.02	±0.008	±200[4]	—	50	Yes	Com
3500VAC Isolation	ISO106	4950	8000	160	130	1.0	10^{14}	6	±0.025	±0.007	±250	—	70	Yes	Ind[3]
	ISO121	4950	5600[2]	160	115	0.5	10^{14}	2	±0.01	±0.005	±150	—	60	Yes	Ind[3]

NOTES: All packages are DIPs except ISO122 which is also available in SOIC. (1) Ind = –25°C to +85°C. Com = 0°C to +70°C. (2) Partial discharge voltage. (3) Hermetic. (4) Typical.

TRANSFORMER-COUPLED ISOLATION AMPLIFIERS

Boldface = NEW

		Isolation Voltage (V)		Isolation Mode Rejection, typ		Leakage Current at Test Voltage	Iso Impedance		Gain Nonlinearity		Voltage Drift	Bias Current	±3dB Freq	Ext Iso Power	
Descrip	Model	Cont Peak	Pulse Test, Peak	DC (dB)	60Hz (dB)	(µA)	(Ω)	(pF)	max (%)	typ (%)	(±µV/°C) max	max	(kHz)	Req	Temp[1]
High Isolation Voltage	3656	3500	8000	160	125	0.5	10^{12}	6	±0.05	±0.03	5+ (1000/G_1)	100nA	30	No	Ind
Low Cost Self-Powered	ISO212	1060	1200[2]	160	115	2	10^{10}	12	±0.025	±0.015	±30 (±30/G_1)	50nA	1	No	Com

NOTES: The package for the 3656G is a DIP, the package for the ISO212P is a SIP. (1) Ind = –25°C to +85°C, Com = 0°C to +70°C. (2) Partial discharge voltage.

CAPACITOR-COUPLED ISOLATION AMPLIFIER, WITH POWER

Boldface = NEW

Description	Model	Isolation Voltage (V) Cont Peak	Isolation Voltage (V) Pulse/ Test, Peak	Isolation Mode Rejection, typ DC (dB)	Isolation Mode Rejection, typ 60Hz (dB)	Leakage Current at Test Voltage (µA)	Iso Impedance (Ω)	Iso Impedance (pF)	Gain Non-linearity max (%)	Gain Non-linearity typ (%)	Voltage Drift (±µV/°C) max	Bias Current	±3dB Freq (kHz)	Temp(1)
1500VAC Input Power	ISO103	2121	5657	160	130	2.0	10^{12}	9	.05	.018	250	—	20	Ind
1500VAC Output Power	ISO113	2121	5657	160	130	2.0	10^{12}	9	0.02	0.012	250	—	20	Ind
2500VAC Input Power	ISO107	3500	8000	160	100	2.0	10^{12}	13	0.025	0.01	400	—	20	Ind

NOTES: All packages are DIPs. (1) Ind = –25°C to +85°C.

ISOLATION POWER SUPPLIES(1)

Boldface = NEW

Description	Model	Isolation Voltage (V) Cont Peak	Isolation Voltage (V) Pulse Test Peak	Input Voltage (VDC) min	Input Voltage (VDC) max	Leakage Current 240VAC 60Hz (µA)	Isolation Impedance (Ω)	Isolation Impedance (pF)	Current, Balanced Loads On All Outputs (mA) Rated	Current, Balanced Loads On All Outputs (mA) Max(1)	Sensitivity To Input Change (V/V)	Temp(2)	Pkg
Single ±15V Output	PWS725A	2121	4000	7	18	2	10^{12}	9	±15	±40	1.15	Ind	DIP
	PWS726A	4950	8000	7	18	2	10^{12}	9	±15	±40	1.15	Ind	DIP
Dual ±15V Output	0722	4950	8000	5	16	1	10^{10}	6	±3-40	±50	1.13	Ind	Mod
Quad ±8V Output	0724	1000	3000	5	16	1	10^{10}	6	±3-16	±60	0.63	Ind	Mod
Multiple Output (1-8)	PWS740	2121	4000	7	20	1.5	10^{12}	3	30(3)	60(3)	1.20	Ind	Sys(4)
	PWS745(8)	1060	1200(9)	4.5(5)	18(6)	1.5	10^{12}	8	±15	30	(7)	Ind	Comp
	PWS750	1060	1200(9)	4.5(5)	18(6)	1.5	10^{12}	8	±15	30	(7)	Ind	Comp

NOTES: (1) See complete Product Data Sheet for full specifications, especially regarding output current capabilities. (2) Ind = –25°C to +85°C. Com = 0°C to +70°C. (3) Per channel. (4) 1 TO-3 driver per 8 channels, plus 2 DIPs per channel. (5) 5V operation. (6) 15V operation. (7) 5V operation: 4.12; 15V operation: 1.2. (8) PWS745-1 driver may also be used with PWS740 and PWS750 components. (9) Partial discharge voltage.

CAPACITOR-COUPLED, DIGITAL COUPLER

Boldface = NEW

Description	Model	Isolation Voltage (V) Cont Peak	Isolation Voltage (V) Pulse Test, Peak	Leakage Current 240VAC 60Hz (µA)	Iso Impedance (Ω)	Iso Impedance (pF)	Data Rate (MHz)	Common Mode Transient Immunity (kV/µs)	Power Consumption per Channel (mW)	Ext Power Req	Temp(1)
Dual Isolated Transceiver	**ISO150**(2)	**2121**	**2400**	**0.6**	**10^{12}**	**5**	**40**	**3**(3)	**250**	**Yes**	**XInd**

NOTES: (1) XInd = 40°C to +85°C. (2) DIP Package. (3) Typical.

SPECIAL FUNCTIONS

Boldface = NEW

Description	Model	Isolation Voltage	Isolation Mode	Leakage Current	Isolation Impedance	Gain Non-linearity	Frequency Response	Input Bias Current	Reference Voltage	Isolated Power Req	Temp. Range	Pkg
Precision Measured Channel	**ISC300**	**500rms**	**60Hz cont**	**4μArms**	**2GΩ||15pF**	**±0.01% (typ)**	**3.5Hz**	**35nA (typ)**	**Yes**	**No**	**0°C to +70°C**	**Mod**

ISOLATION CURRENT TRANSMITTER

Boldface = NEW

Description	Model	Span	Temperature Drift	Input	Output	Temperature Range	Pkg
Two-wire	**IXR100**	**untrimmed error (max): –2.5%** **non-linearity (max): 0.01% (EMF), 0.1% (RTD)**	**50ppm (typ)** **100ppm (max)**	**Offset Voltage 500μV (max)** **Offset Voltage vs Temp 5μV/°C** **CMR vs Supply 100dB**	**Current Range 4 - 20mA** **Current Limit 32mA** **Isolation Voltage 1500rms**	**–20 to +70°C**	**Mod**

Special Functions

SPECIAL FUNCTIONS

Function	Model	Description	Comments	Temp Range[1]	Pkg
Multifunction Converter	4302	$Y (Z/X)^m$ This function may be used to multiply, divide, raise to powers, take roots and form sine and cosine functions.	Plastic Package.	Ind	DIP
Logarithmic Amplifier	LOG100	K Log (I_1/I_2)	Optimized for log ratio of current inputs. Specified over six decades of input (1nA to 1mA), 55mV total error, 0.25% log conformity.	Com	DIP
	4127	K Log (I_1/I_{REF})	A more versatile part that contains an internal reference and a current inverter. 1% and 0.5% accuracy.	Com	DIP
$\sqrt{\frac{1}{T}\int_0^T E_{IN}^2(t)dt}$	4341	True rms-to-DC conversion based on a log-antilog proportional approach. Pin compatible with 4340.	Some external trimming required. Lower cost in plastic package.	Ind	DIP
Switched Integrator	ACF2101	This is a dual, integrating, transimpedance amplifier that converts an input current to an output voltage by integrating the current for a user determined period of time. Eliminates large feedback resistor of traditional I to V converters.	Includes HOLD and RESET switches and output multiplexer. $V_{OUT} = -\frac{1}{C}\int i_{IN}dt$	Ind	DIP, SOIC
Photodiode	**OPT201**	**Photodiode and Amplifier 0.090 x 0.090 inch photodiode with transimpedance amplifier.**	**Includes internal 1MΩ feedback resistor.**	**Com**	**DIP**
	OPT202	**Photodiode and Amplifier similar to OPT201 but response to 50kHz.**	**Includes internal 1MΩ feedback resistor.**	**Com**	**DIP**

NOTE: (1) Com = 0°C to +70°C, Ind = –25°C to +85°C.

MULTIPLIERS/DIVIDERS

Boldface = NEW

Model	Transfer Function	Error at +25°C max (%)	Temp Coeff (%/°C)	Feed-through (mV)	Offset Voltage (mV)	1% BW (kHz)	Temp Range[1]	Pkg
MPY100	$[(X_1 - X_2)(Y_1 - Y_2)/10] + Z_2$	±0.5	0.008	30	7	70	Ind	TO-100
MPY534	$[(X_1 - X_2)(Y_1 - Y_2)/10] + Z_2$	±0.25	0.008	0.05%	2	3MHz	Com	TO-100
MPY600	$[(X_1 - X_2)(Y_1 - Y_2)/2] + Z_2$	±0.025	0.02	2	5	10MHz	Ind	DIP
MPY634	$[(X_1 - X_2)(Y_1 - Y_2)/10] + Z_2$	±0.5	0.015	0.15%	2	10MHz	Ind	TO-100, DIP, SOIC

NOTE: (1) Com = 0°C to +70°C, Ind = –25°C to +85°C, Mil = –55°C to +125°C.

DIVIDERS

Model	Transfer Function	Input Range	Accuracy D = 250mV max (%)	Temp Coeff (%/°C)	0.5% BW (kHz)	Rated Output, min	Temp Range[1]	Pkg
DIV100	10 x N/D	250mV to 10V	0.25	0.2	15	±10V, ±5mA	Com	DIP

NOTE: (1) Com = 0°C to +70°C.

FREQUENCY PRODUCTS

Boldface = NEW

Function	Model	Description	Comments	Temp Range[1]	Pkg
Oscillator	4423	Very low cost in plastic package. Provides resistor-programmable quadrature outputs (sine and cosine wave outputs simultaneously available).	Frequency range: 0.002Hz to 20kHz. Frequency stability: 0.01%/°C. Quadrature phase error: ±0.1%.	Com	DIP
Universal Active Filter	UAF42	These filters provide a complex pole pair. State-variable type, low-pass, high-pass, and bandpass outputs.	Add only resistors to determine pole location (frequency and Q). Easily cascaded for complex filter responses.	Ind	DIP, SOIC
	UAF41			Ind	DIP
	UAF21			Ind	DIP

NOTE: Com = 0°C to +70°C, Ind = –25°C to +85°C.

References and Regulators

VOLTAGE REFERENCE

Boldface = NEW

Description	Model	Output (V)	Min Output (mA)	Max Drift ±ppm/°C	Power Supply (V) (mA)	Typ Range	Pkg
+5V Precision	**REF02M, G**	**+5.00 ±0.09**	**10**	**10**	**+7/40 1.4**	**Mil, Ind**	**TO-99 Ceramic**
Voltage Reference	**REF02P, U**	**+5.00 ±0.03**	**10**	**8.5**	**+7/40 1.4**	**Com, Ind**	**PDIP, SO Die**
Guaranteed Long-Term Stability—25± ppm/1k hrs	**REF05M**	**+5.00 ±0.09**	**10**	**8.5**	**+7/40 1.4**	**Mil**	**TO-99**
+10V Precision	**REF01M, G**	**+10.00 ±0.025**	**10**	**10**	**+11.4/40 1.4**	**Mil, Ind**	**TO-99 Ceramic**
Voltage Reference	**REF01P, U**	**+10.00 ±0.020**	**10**	**8.5**	**+11.4/40 1.4**	**Ind, Com**	**PDIP, SO Die**
Guaranteed Long-Term Stability	REF10M	+10.00 ±0.005	10	1	+13.5/35 4.5	Com	TO-99
±10V Precision Voltage Reference	REF101	±10.00 ±0.005	10	1	+13.5/35 4.5	Com	TO-99
±10V Precision Voltage Reference	REF102	±10.00 ±0.0025	10	2.5	+11.4/36 1.4	Ind, Mil	TO-99, DIP, SOIC
Precision Micropower Voltage Reference	**REF1004C**	**+1.235 ±0.002**	**10mA**	**0.6Ω**	**20ppm/°C**	**Com**	**SOIC**
	REF1004I	**+1.235 ±0.0004**	**10mA**	**0.6Ω**	**20ppm/°C**	**Ind**	**SOIC**
	REF1004C	**+2.50 ±0.0009**	**20mA**	**0.6Ω**	**20ppm/°C**	**Com**	**SOIC**
	REF1004I	**+2.50 ±.018**	**20mA**	**0.6Ω**	**20ppm/°C**	**Ind**	**SOIC**

NOTE: (1) Com = 0°C to +70°C. Ind = –25°C to +85°C, Mil = –55°C to +125°C.

CURRENT REFERENCE

Boldface = NEW

Model	Output I (μA)	Max Drift Compliance	(ppm/°C)	Comments	Temp Range[1]	Pkg
REF200	Dual 100 ±0.5	2.5 V to 40V	25	Includes 0.5% accurate current mirror	Ind	DIP, SOIC

NOTE: (1) Ind = –25°C to +85°C.

VOLTAGE REGULATORS

Boldface = NEW

Description	Model	Output Voltage	Dropout Voltage at 800mA	Line Regulation (mV)	Load Regulation (mV)	Quiescent Current mA	Operating Junction Temp	Pkg
+2.85V Voltage Regulator For SCSI-2 Active Termination	**REG1117-2.85**	**+2.85**	**1.2V (max)**	**6 (max)**	**10 (max)**	**10 (max)**	**0°C to +125°C**	**SOT-223**
+5.0V Voltage Regulator	**REG1117-5**	**+5**	**1.2V (max)**	**10 (max)**	**15 (max)**	**10 (max)**	**0°C to +125°C**	**SOT-223**
	REG1117-3, 3.3	**+3, +3.3**	**1.2V (max)**	**7 (max)**	**12 (max)**	**10 (max)**	**0°C to +125°C**	**SOT-223**

Burr-Brown

Digital-to-Analog Converters

AUDIO, VIDEO AND COMMUNICATIONS DIGITAL-TO-ANALOG CONVERTERS

Boldface = NEW

Model	Resolution (Bits)	Max Update Rate	Max THD + N (V_{OUT} = FS)	Output Range	Input Format	Power Supply (V)	Package[1]	Max Power Dissipation (mW)
DAC600	**12**	**256MHz**	**–74dB SFDR**	**–1V, –20mA**	**Parallel**	**–5.2**	**68 PLCC**	**1.3W**
DAC650	**12**	**500MHz**	**–70dB SFDR**	**±1V, ±20mA**	**Parallel**	**±15, ±5**	**68 LEAD**	**2.0W**
PCM53	16	500kHz	–88dB (JP) –92dB (KP)	±10V, ±1mA	Parallel	±15, +5	DDIP	600
PCM54	16	500kHz	–82dB (HP) –88dB (JP) –92dB (KP)	±3V, ±1mA	Parallel	±5 to ±12	DDIP	300
PCM55	16	500kHz	–82dB (HP) –88dB (JP)	±3V, ±1mA	Parallel	±5	SO	125
PCM56	16	800kHz	–82dB (P) –88dB (P-J) –92dB (P-K)	±3V, ±1mA	Serial Latched	±5 to ±12	DIP, SO	260
PCM66	16	200kHz	–82dB (P) –88dB (P-J)	2.6Vp-p, 2-Channel	Serial Latched	+5 Latched	SO	50
PCM1700 (Dual DAC)	18	800kHz	–82dB (P) –88dB (P-J) –92dB (P-K)	±3V, ±0.67mA	Serial Latched	±5	DDIP, SO	475
PCM58	18	1MHz	–92dB (P) –94dB (P-J) –96dB (P-K)	±1mA	Serial Latched	+5, –12	DDIP	400
PCM61	18	800kHz	–82dB (P) –88dB (P-J) –92dB (P-K)	±3V, ±1mA	Serial Latched	±5 to ±12	DDIP	260
PCM63	20	1MHz	–88dB (P) –92dB (P-J) –96dB (P-K)	±2mA	Serial Latched	±5	DDIP	300
PCM67/69 (Dual DAC)	18	1MHz	–82dB (P) –88dB (P-J) –92dB (P-K)	1.2mA	Serial Latched	+5	DIP, SO	105
PCM1702	20	1MHz	–88dB (P, U) –92dB (P-J) –96dB (P-K)	±1.2mA	Serial Latched	±5	DIP, SO	250

NOTE: (1) DIP = 0.3" wide DIP, DDIP = 0.6" wide DIP, SO = Small Outline Surface Mount.

DIGITAL SIGNAL PROCESSING DIGITAL-TO-ANALOG CONVERTERS

Boldface = NEW

Model	Resolution (Bits)	Linearity Error (%FSR)	Settling Time (μs)	Output Range	Signal-to-Noise + Distortion Ratio (dB)	Total Harmonic Distortion (dB)	Temp Range[1]	Pkg[2]
DSP-Compatible Digital Interface (Single—DSP201, Dual—DSP202):								
DSP201	18	±0.006	—	±3V	86, f_{OUT} = 2kHz	–90	Ind	DDIP
DSP202	18	±0.006	—	±3V	86, f_{OUT} = 2kHz	–90	Ind	DDIP

NOTES: (1) Com = 0°C to +70°C, Ind = (–25°C to +85°C). (2) DDIP = 0.6" wide DIP.

INSTRUMENTATION DIGITAL-TO-ANALOG CONVERTERS

Boldface = NEW

Description	Model	Resolution (Bits)	Linearity Error (%FSR)	Settling Time (µs)	Output Range	Temp Range[1]	Pkg[2]
Very High Resolution	DAC729	18	±0.00075	5	±1mA, –2mA; +5V, +10V, ±5V, ±10V	Com	DDIP
General Purpose	DAC700	16	±0.0015	1	–2mA	Com, Ind, Mil	DDIP
	DAC701	16	±0.0015	8	+10V	Com, Ind, Mil	DDIP
	DAC702	16	±0.0015	1	±1mA	Com, Ind, Mil	DDIP
	DAC703	16	±0.0015	8	±10V	Com, Ind, Mil	DDIP, SO
Lowest Cost	DAC1600	16	±0.003	8 typ	±10V	Com	DDIP
Bus Interface:							
16-Bit Parallel	DAC707	16	±0.003	8	±10V	Com, Ind, Mil	DDIP
Serial/8-bit Parallel	DAC708	16	±0.003	1	±1mA, –2mA	Com, Ind, Mil	DDIP
Serial/8-bit Parallel	DAC709	16	±0.003	8	±5V, ±10V, +10V	Com, Ind, Mil	DDIP
Dual,Ser./8-bit Par.	DAC725	16	±0.003	8	±10V	Com, Ind	DDIP
Industry Standard	DAC7541A	12	±0.012	1	0 to 1mA	Com, Ind, Mil	DIP, SO
Ind. Std. w/Latch	DAC7545	12	±0.012	2	0 to 1mA	Com, Ind, Mil	DIP, SO
Dual w/Bus Interface:							
Serial Input	DAC7800	12	±0.012	0.8	0 to 1mA	Ext	DIP, SO
8-bit Port Interface	DAC7801	12	±0.012	0.8	0 to 1mA	Ext	DIP, SO
12-bit Port Interface	DAC7802	12	±0.012	0.8	0 to 1mA	Ext	DIP, SO
Single w/Bus Interface, Serial Input	**DAC8043**	**12**	**±0.012**	**0.25 typ**	**0 to 1mA**	**Ind, Com**	**DIP, SO, Die**
	DAC543	**12**	**±0.012**	**0.25 typ**	**0 to 1mA**	**Ind, Com**	**DIP, SO, Die**
Flexible Bus Interface:							
Industry Standard Pinout	DAC667	12	±0.006	4	±2.5V, ±5V, ±10V +5V, +10V	Com, Ind, Mil	DIP
	DAC811	12	±0.006	4	±5V, ±10V, +10V	Com, Ind, Mil	DDIP, SO
Small, Low Cost	DAC813	12	±0.006	4	±5V, ±10V, +10V	Com, Ext, Mil	DIP, SO
Lowest Cost	DAC1201	12	±0.018	4 typ	±5V, ±10V, +10V	Com	DDIP
Industry Standard, General Purpose	DAC80	12	±0.012	0.3, 3 typ	±1mA, –2mA; +5V, +10V, ±5V, ±10V	Com	DDIP
Dual, 12-bit Port	DAC2813	12	±0.006	6	±10, 0 to 10	Ext	DDIP
Dual, Multiplying Serial Port	DAC2814	12	±0.012	10	$+V_S$, –1.4V $-V_S$, +1.4V	Ext	DDIP
Dual Multiplying 8-bit Port	DAC2815	12	±0.012	10	$+V_S$, –1.4V $-V_S$, +1.4V	Ext	DDIP
QUAD, 12-bit Port	DAC4813	12	±0.012	6	±10	Ext	DDIP
QUAD, Multiplying Serial Port	DAC4814	12	±0.012	10	$+V_S$, –1.4V $-V_S$, +1.4V	Ext	DDIP
Dual Multiplying 8-bit Port	DAC4815	12	±0.012	10	$+V_S$, –1.4V $-V_S$, +1.4V	Ext	DDIP
Dual Multiplying DAC	**DAC7528**	**8**	**±0.012**	**0.18**	**0 to 1mA**	**Ind, Com**	**DIP, SO, Die**

NOTES: (1) Temperature Range: Com = 0°C to +70°C, Ind = –25°C to +85°C, Ext = –40°C to +85°C, Mil = –55°C to +125°C. (2) DIP = 0.3" wide DIP, DDIP = 0.6" wide DIP, SO = small outline surface mount.

STILL AVAILABLE BUT NOT IN DATA BOOK

Description	Model	Resolution (Bits)	Linearity Error (%FSR)	Settling Time (µs)	Output Range	Temp Range	Pkg
Industry Standard, General Purpose	DAC85H	12	±0.012	3 typ	+10V, ±5V, ±10V	Ind	DDIP
	DAC87H	12	±0.012	3 typ	+10V, ±5V, ±10V	Mil	DDIP

Burr-Brown

Analog Multiplexers

ANALOG MULTIPLEXERS

Boldface = NEW

Description	Model	Channels	Input Range (V)	On Resistance max (Ω)	Settling Time (to 0.01%)	Temp Range(1)	Pkg(2)
Protected Inputs	**MPC506AP**	**16-channel single ended**	**±15**	**1.8k**	**3.5μs**	**Com**	**28-p PDIP**
	MPC506AG	**16-channel single ended**	**±15**	**1.8k**	**3.5μs**	**Ext**	**28-p CDIP**
	MPC506AU	**8-channel differential**	**±15**	**1.8k**	**3.5μs**	**Com**	**29-p SOIC**
	MPC507AP	**8-channel differential**	**±15**	**1.8k**	**3.5μs**	**Com**	**28-p PDIP**
	MPC507AG	**8-channel differential**	**±15**	**1.8k**	**3.5μs**	**Ext**	**28-p CDIP**
	MPC507AU	**8-channel**	**±15**	**1.8k**	**3.5μs**	**Com**	**28-p SOIC**
	MPC508AP	**8-channel single ended**	**±15**	**1.8k**	**3.5μs**	**Com**	**16-p PDIP**
	MPC508AG	**8-channel single ended**	**±15**	**1.8k**	**3.5μs**	**Ext**	**16-p CDIP**
	MPC508AU	**8-channel single ended**	**±15**	**1.8k**	**3.5μs**	**Com**	**16-p SOIC**
	MPC509AP	**4-channel differential**	**±15**	**1.8k**	**3.5μs**	**Com**	**16-p PDIP**
	MPC509AG	**4-channel differential**	**±15**	**1.8k**	**3.5μs**	**Ext**	**16-p CDIP**
	MPC509AU	**4-channel differential**	**±15**	**1.8k**	**3.5μs**	**Com**	**16-p SOIC**
High Speed	MPC800KG	16 single or 8 differential	±15	750	800ns	Com	CDIP
	MPC800SG	16 single or 8 differential	±15	750	800ns	Mil	CDIP
	MPC801KG	8 single or 4 differential	±15	750	800ns	Com	CDIP
	MPC801SG	8 single or 4 differential	±15	700	800ns	Mil	CDIP
				Input Impedance	Bandwidth		
Buffered 4 x 1	**MPC100AP**	**4-channel single ended**	**±4.2**	**0.88MΩ**	**450MHz**	**Ext**	**14-p PDIP**
	MPC100AU	**4-channel single ended**	**±4.2**	**0.88MΩ**	**450MHz**	**Ext**	**14-p SOIC**
Buffered Dual 2 x 1	**MPC102AP**	**dual 2-channel single ended**	**±4.2**	**0.88MΩ**	**450MHz**	**Ext**	**14-p PDIP**
	MPC102AU	**dual 2-channel single ended**	**±4.2**	**0.88MΩ**	**450MHz**	**Ext**	**14-p PDIP**

NOTES: (1) Temperature Range: Com = 0°C to +70°C, Ext = –40°C to +85°C, Mil = –55°C to +125°C. (2) CDIP = Ceramic DIP, PDIP = Plastic DIP.

Sample/Hold Amplifiers

HIGH-SPEED SAMPLE/HOLD AMPLIFIERS

Boldface = NEW

Description	Model	Gain Error (%)	Offset Error (mV)	Ampl BW –3dB, (MHz)	Acq Time (µs max)	Droop Rate (µV/µs)	Temp Range(1)	Input Range (Vp-p)	Pkg(2)	Q(3) Screen
High Speed	SHC804	±0.1	±3	16	0.35	±5	Ind	20	HMD	Q
High Speed with Buffer	SHC803	±0.1	±3	16	0.35	±5	Ind	20	HMD	Q
Ultra-High Speed	SHC600	±0.1	±5	70	0.05	±180	Ind	2.5	CDIP	Q
Low Cost	**SHC605**	**±0.1**	**±5**	**125**	**0.02(4)**	**±5000**	**Ext**	**4.0**	**16-p SOIC**	—
High Linearity	SHC702	±0.1	±3	3	0.8	±2	Ind	20	24-p HMD	—

NOTES: (1) Temperature Range: Com = 0°C to +70°C, Ind = –25°C to +85°C, Mil = –55°C to +125°C, Ext = –40°C to +85°C. (2) MC = Metal Can, PDIP = Plastic DIP, HCD = Hermetic Ceramic DIP, CD = Ceramic DIP, HMD = Hermetic Metal DIP, SOIC = Surface Mount Package. (3) Q indicates optional reliability screening is available for this model. BI indicates that an optional 160 hour burn-in is available for the model. (4) Typical.

SAMPLE/HOLD AMPLIFIERS

Boldface = NEW

Description	Model	Gain Error (%)	Offset Error (mV)	Charge Offset (mV)	Acq Time (µs max)	Droop Rate (µV/ms)	Temp Range(1)	Pkg(2)	Q, BI(3) Screen
Fast, High Accuracy	SHC76	±0.02	±3	±6 typ	3	1	Ind, Com, Miil	HMD	—
Low Cost. Fast Industry Std.	SHC5320	NA	±0.5	±1 typ	1.5	0.5	Com, Mil	HCD PDIP, SOIC, Die	BI
Lowest Cost Industry Std	SHC298	±0.01	±7	±25 max	10	100	Com, Ind	PDIP, MC, SOIC	BI
Wideband DC Restoration Circuit	**SHC615**	**TBD**	**±0.5**	**NA**	**30µs**	**TBD**	**Xlind**	**PDIP, SOIC**	—

NOTES: (1) Temperature Range: Com = 0°C to +70°C, Ind = –25°C to +85°C, Mil = –55°C to +125°C, Ext = –40°C to +85°C. (2) MC = Metal Can, PDIP = Plastic DIP, HCD = Hermetic Ceramic DIP, CD = Ceramic DIP, HMD = Hermetic Metal DIP, SOIC = Surface Mount Package. (3) Q indicates optional reliability screening is available for this model. BI indicates that an optional 160 hour burn-in is available for the model. (4) Typical.

Voltage-to-Frequency Converters

VOLTAGE-TO-FREQUENCY CONVERTERS

Boldface = NEW

Description	Model	Frequency Range (kHz)	V_{IN} Range (V)	Linearity, max (% of FSR)	Tempco, max (ppm of FSR/°C)	Temp Range(1)	Pkg
Low-Cost Monolithic	VFC32	User-selected 500kHz, max	User-selected	±0.01 at 10kHz ±0.05 at 100kHz	75 typ ±100	Com Ind, Mil	DIP, SOIC TO-100,
Low-Cost Complete	VFC42	0 to 10	0 to +10	±0.01	±100	Ind	DIP
	VFC52	0 to 100	0 to +10	±0.05	±150	Ind	DIP
Precision Monolithic	VFC62	User-selected 1MHz max	User-selected	±0.002 at 10kHz	±20	Ind	DIP, TO-100
	VFC320			±0.002 at 10kHz	±20	Ind, Mil	DIP, TO-100
Synchronized Monolithic	VFC100	Clock-Programmed 2MHz max	0 to +10	0.1 at 1MHz	±50	Ind, Mil	DIP
	VFC101	Clock-Programmed, 2MHz max	0 to +10, 0 to +5, 0 to +8, –5 to +5	±0.02 at 100kHz	±40	Ind	PLCC
High-Performance	VFC110	User-selected 4MHz max	0 to +10	±0.05 at 1MHz	±50	Ind	DIP
Single Supply, Low Power	VFC121	User-selected 1.5MHz max	User-selected	±0.03 at 100kHz	±40	Ind	DIP

NOTE: (1) Com = 0°C to +70°C, Ind = –25°C to +85°C.

Data Acquisition Components

HIGH-SPEED ANALOG-TO-DIGITAL CONVERTERS

Boldface = NEW

Description	Model	Resolution (Bits)	Linearity Error, max (%FSR)	Input Range (V)	Sampling Rate	THD (dB, typ)	Temp Range(1)	Pkg(2)	Q(3) Screen
High Accuracy, High Resolution	ADC701	16	±0.003	10V/20V	512kHz	94w/SHC702	Com	TDIP	Q
	ADC750	22	±0.003	10V	400kHz	—	Com	Board	—
High Speed Medium Resolution	ADC614	14	±0.006	±1.25	5.12MHz	88/Nyquist	Ind	QDIP	Q
	ADC603	12	±0.018	±1.25	10MHz	68	Com, Ind, Mil	QDIP	Q
	ADC601	12	±0.012	10V/20V	1MHz	70w/SHC804	Com	TDIP	
	ADS602	12	±0.03	10V/20V	1MHz	66	Com	TDIP	—
	ADC803	12	±0.012	10V/20V	1MHz	NA	Ind, Mil	HMD	Q

AUDIO ANALOG-TO-DIGITAL CONVERTERS

Description	Model	Resolution (Bits)	Typical DC Linearity Accuracy	Input Range (V)	Conversion Time (µs)	THD+N dB, max (V_{IN} = ±FS)	Output Format	Pkg(2)
Low Cost	PCM78	16	14-Bit	±3	5	–88	Serial	DDIP
Dual	PCM1750	18	14-Bit	±2.75	5	–90	Serial	DDIP, SOIC
Dual ΔΣ	PCM1760	20	16-Bit	±2.5	20	–90	Serial	DDIP, SOIC
Single Channel	DSP101	18	14-Bit	±2.75	5	–90	Serial	DDIP
Dual Channel	DSP102	18	14-Bit	±2.75	5	–90	Serial	DDIP

NOTES: (1) Com = 0°C to +70°C, Ind = –25°C to +85°C, Mil = –55°C to +125°C. (2) DIP = 0.3" wide DIP, DDIP = 0.6" wide DIP, TDIP = 0.9" wide DIP, PLCC = Plastic Leaded Chip Carrier, SO = Small Outline Surface Mount. QDIP = 1.2" wide DIP. (3) Q indicates optional reliability screening is available for this model.

INSTRUMENTATION ANALOG-TO-DIGITAL CONVERTERS

Boldface = NEW

Description	Model	Resolution (Bits)	Linearity Error (%FSR)	Input Range (V)(1)	Conversion Time or Sampling Rate	NMC Resolution	Temp Range(2)	Pkg(3)
Data-Bus Interface	ADC700	16	±0.003	5, 10, 20 U/B	17µs	14	Mil, Ind, Com	TDIP
Industry Std Pinouts	ADC71	16	±0.003	5, 10, 20 U/B	50µs	14	Ind, Com	TDIP
	ADC76	16	±0.003	5, 10, 20 U/B	17µs	14	Ind, Com	TDIP
Sampling 574 Type	ADS574	12	±0.012	10, 20, U/B	40kHz	12	Com, Mil	DIP, DDIP SO
Sampling 774 Type	ADS774	12	±0.012	10, 20, U/B	8.5µs	12	Com, Mil	DIP, DDIP SO
Sampling, Interface	ADS7800	12	±0.012	10, 20 B	333kHz	12	Com, Ind	DIP SO
High-Accuracy, 4-Channel, Auto-Calibration, Sampling	ADC7802	12	±0.012	0 to +5	8.5µs	12	Ext	DDIP, PLCC
	ADS7803	12	±0.018	0 to +5	8.5µs	12	Ext	DDIP, PLCC
CMOS Sampling Family	**ADS7804**	**12**	**±0.012**	**20B**	**10µs**	**12**	**Ext**	**DIP, SO**
	ADS7805	**16**	**±0.0015**	**20B**	**10µs**	**16**	**Ext**	**DIP, SO**
	ADS7806	**12**	**±0.012**	**4, 5, 20U/B**	**25µs**	**12**	**Ext**	**DIP, SO**
	ADS7807	**16**	**±0.0015**	**4, 5, 20U/B**	**25µs**	**16**	**Ext**	**DIP, SO**
	ADS7808	**12**	**±0.012**	**4, 5, 10, 20U/B**	**10µs**	**12**	**Ext**	**DIP, SO**
	ADS7809	**16**	**±0.0015**	**4, 5, 10, 20U/B**	**10µs**	**16**	**Ext**	**DIP, SO**
	ADS7810	**12**	**±0.012**	**20B**	**1.25µs**	**12**	**Ext**	**DIP, SO**
	ADS7819	**12**	**±0.012**	**5B**	**1.25µs**	**12**	**Ext**	**DIP, SO**
Industry Std Pinout and Interface	ADC574A	12	±0.012	10, 20 U/B	25µs	12	Mil,Ind,Com	DDIP
	ADC674A	12	±0.012	10, 20 U/B	15µs	12	Mil,Ind,Com	DDIP
	ADC774	12	±0.012	10, 20 U/B	8.5µs	12	Mil,Ind,Com	DDIP
Medium Speed Monolithic	ADC80AG	12	±0.012	5, 10, 20 U/B	25µs	12	Ind	TDIP
	ADC80MAH	12	±0.012	5, 10, 20 U/B	25µs	12	Ind	TDIP
Medium Speed	ADC84KG	12	±0.012	5, 10, 20 U/B	10µs	12	Ind	TDIP
	ADC85H	12	±0.012	5, 10, 20 U/B	10µs	12	Com	TDIP
Mil Temperature Range	ADC87H	12	±0.012	5, 10, 20 U/B	10µs	12	Mil	TDIP
High Accuracy	**DDC101**	**20**	**±2.5ppm(4)**	**Current and Voltage**	**64µs**	**TBD**	**Ind**	**DDIP, SOIC**

NOTES: (1) U/B indicates the input voltage range for the model: U = unipolar, B = Bipolar. (2) Com = 0°C to +70°C, Ext = –40°C to +85°C, Ind = –25°C to +85°C, Mil = –55°C to +125°C. (3) DIP = 0.3" wide DIP, DDIP = 0.6" wide DIP, TDIP = 0.9" wide DIP, PLCC = Plastic Leaded Chip Carrier, SO = Small Outline Surface Mount. (4) Linearity errors ±0.025% reading ±2.5ppm FSR.

STILL AVAILABLE BUT NOT IN DATA BOOK

Description	Model	Resolution (Bits)	Linearity Error (%FSR)	Input Range (V)(1)	Conversion Time or Sampling Rate	NMC Resolution	Temp Range(2)	Pkg(3)
Serial Output	ADC804	12	±0.012	5,10,20 U/B	17µs	12	Mil,Ind,Com	DDIP

Flash Memories

Density	Device	Access Time (ns)	Icc (Max/ Standby)	# Pins	Pkg Types	Voltage	Production Availability
1 MEG (128Kx8)	CAT28F010	120, 150, 200	30mA/100µA	32	P, N, T	12 V	NOW
	CAT29C010	90, 120, 150	40mA/20µA	32	P, N, T	3, 5 V	4Q94
	CAT28F001BX-T	120, 150, 200	30mA/100µA	32	P, N, T	12 V	4Q94
	CAT28F001BX-B	120, 150, 200	30mA/100µA	32	P, N, T	12 V	4Q94
2 MEG (256Kx8)	CAT28F020	120, 150, 200	30mA/100µA	32	P, N, T	12 V	1Q94
4 MEG (256Kx16)	CAT28F400	120, 150, 200	45mA/100µA	44	T	12 V	2Q94

Contact factory for PCMCIA flash cards and die availability.

Parallel E^{2}PROMs

Density	Device	Features	Access Time (ns)	Icc (Max/ Standby)	# Pins	Pkg Types	Voltage	Production Availability
16K-Bit (2Kx8)	CAT28C16A	Data polling Hardware write protection	200	25 mA/100µA	24 32	P, K, J N	5V	NOW
	CAT28C17A	Data polling Hardware write protection RDY/BUSY hardware pin	200	25mA/100µA	28 32	P, K, J N	5V	NOW
64K-Bit (8Kx8)	CAT28C64B	Data polling, Toggle bit Software Data Protection- (SDP) 32 byte page	150/200	25mA/100µA	28 32	P, K, J N, T	5V	NOW
	CAT28C65B	Data polling, Toggle bit Software Data Protection- (SDP) 32 byte page RDY/BUSY hardware pin	150/200	25mA/100µA	28 32	P, K, J N, T	5V	NOW
256K-Bit (32Kx8)	CAT28C256	Data polling, Toggle bit Software Data Protection- (SDP) 64 byte page	200/250/300	30mA/150µA	28 32	P N	5V	NOW

Catalyst Sales Offices: *West U.S.*, 408-748-7700 • *Central U.S.*, 708-240-1253 • *Northeast U.S.*, 617-356-3899 • *Southeast U.S.*, 407-682-1995 • *Europe — Belgium*, 32.2.267.7025; *Germany*, 49.40.209.9955 • *Japan N.C.K.K.*, 81-5340-3781.

Wire Bus Structure

ensity	Device	Features	Icc (Max/ Standby)	Max Clock Freq	# Pins	Pkg Types	Voltage	Production Availability
1K (128x8)	CAT24C01	I^2C compatible. Hardware Write Protect pin. 8 byte page	3mA/4µA	100kHz	8 14	P, J J	5V	2Q94
	CAT24LC01	I^2C compatible. Hardware Write Protect pin. 8 byte page	3mA/4µA	100kHz	8 14	P, J J	3-6V	2Q94
2K (256x8)	CAT24C02	I^2C compatible. Hardware Write Protect pin. 8 byte page	3mA/4µA	100kHz	8 14	P, J J	5V	NOW
	CAT24LC02	I^2C compatible. Hardware Write Protect pin. 8 byte page	3mA/4µA	100kHz	8 14	P, J J	3-6V	NOW
	CAT24C02A	I^2C compatible. 8 byte page	3mA/4µA	100kHz	8 14	P, J J	5V	NOW
	CAT24LC02A	I^2C compatible. 8 byte page	3mA/4µA	100kHz	8 14	P, J J	3-6V	NOW
4K (512x8)	CAT24C04	I^2C compatible. 16 byte page	3mA/4µA	100kHz	8 14	P, J J	5V	NOW
	CAT24LC04	I^2C compatible. 16 byte page	3mA/4µA	100kHz	8 14	P, J J	3-6V	NOW
8K 1024x8)	CAT24C08	I^2C compatible. 16 byte page	3mA/4µA	100kHz	8 14	P, J J	5V	NOW
	CAT24LC08	I^2C compatible. 16 byte page	3mA/4µA	100kHz	8 14	P, J J	3-6V	NOW
16K 2048x8)	CAT24C16	I^2C compatible. 16 byte page	3mA/4µA	100kHz	8 14	P, J J	5V	NOW
	CAT24LC16	I^2C compatible. 16 byte page	3mA/4µA	100kHz	8 14	P, J J	3-6V	NOW

te:
All I^2C (2-wire Bus) devices offered in Zero Power™ (t_{SBZ} = 0µA) version.
For information on military temperature devices, please contact the factory.
(2) Catalyst Semiconductor is licensed by Philips Corporation to carry the I^2C Bus Protocol.

-Wire Bus Structure

Density	Device	Features	Icc (Max/ Standby)	Max Clock Freq	# Pins	Pkg Types	Voltage	Production Availability
1K (64x16 r 128x8)	CAT93C46A	National 93C46 compatible 64 x 16 only Pin 7 = no connect	3mA/100µA	1MHz	8	P, K, S	5V	NOW
	CAT93C46	Org. pin for x8 or x16 National 93C46 compatible	3mA/100µA	1MHz	8	P, K, S, J	5V	NOW
	CAT33C101	Org. pin for x8 or x16 National 93C46 compatible	2mA/50µA	250kHz	8	P, K, J	3V	NOW
2K (126x16 r 256x8)	CAT93C56	Org. pin for x8 or x16 National 93C56 compatible	3mA/1000µA	1MHz	8	P, K, S	5V	NOW 2Q94
	CAT93LC56	Org. pin for x8 or x16 National 93C56 compatible	2mA/50µA	250kHz	8	P, K, S	3V	NOW 2Q94
	CAT35C102	Org. pin for x8 or x16	3mA/100µA	1MHz	8	P, K, S	5V	NOW 2Q94
4K (256x16 r 512x8)	CAT33C104	Org. pin for x8 or x16 National 93C66 compatible	2mA/50µA	250kHz	8	P, K, S	3V	NOW 2Q94
	CAT35C104	Org. pin for x8 or x16 National 93C66 compatible	3mA/100µA	1MHz	8	P, K, S	5V	NOW 2Q94
16K 1024x16 r 2048x8)	CAT33C116	Org. pin for x8 or x16 Hardware Write Protect pin Sequential Read Operation	2mA/10µA	1MHz	8	P, S	3V	NOW
	CAT35C116	Org. pin for x8 or x16 Hardware Write Protect pin Sequential Read Operation	3mA/10µA	3MHz	8	P, S	5V	NOW

te: (1) For information on military temperature devices, please contact the factory.

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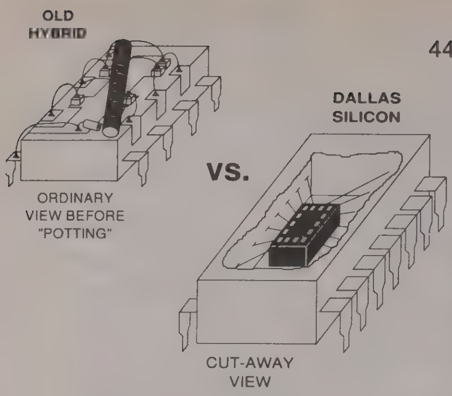

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SEMICONDUCTOR

Eight Years Experience Making Silicon Delay Lines

- All-silicon time delays
- Leading and trailing edge accuracy
- Auto-insertable, low-profile
- Standard 14-pin DIP, 8-pin DIP, Gullwing
- 16-pin SOIC, 8-pin SOIC
- Extended temperature range available
- Low-power CMOS
- TTL/CMOS-compatible
- Vapor phase, IR and wave solderability
- Custom delays and quick turn prototypes available

	5-TAP DEVICES	
DS1000 5-Tap Silicon Delay Line	8 & 14-Pin DIP & GULLWING 14-Pin DIP Sheared NC 8 & 16-Pin SOIC	20 to 500ns delays Pin compatible with standard hybrids
DS1004 5-Tap Silicon Delay Line Tap-to-tap tolerances	8-Pin DIP & GULLWING 8-Pin SOIC	2 to 5ns tap-to-tap increments Fully temperature and voltage compensated
DS1005 5-Tap Silicon Delay Line Voltage Compensated	8 & 14-Pin DIP & GULLWING 14-Pin DIP Sheared NC 16-Pin SOIC	60 to 250ns delays Temperature and voltage compensated and compatible with standard hybrids
	RISC APPLICATION DEVICES	
DS1003 4-Tap Silicon Delay Line	8 & 14-Pin DIP & GULLWING	Tolerance ±0.5ns
	10-TAP DEVICES	
DS1010 10-Tap Silicon Delay Line	14-Pin DIP & GULLWING 16-Pin SOIC	50 to 1000ns delays Pin compatible with standard hybrids
	MULTIPLE INDEPENDENT DELAY DEVICES	
DS1007 7-in-1 Silicon Delay Line	16-Pin DIP & GULLWING 16-Pin SOIC	3 to 40ns delays High speed device with 7 independent delays
DS1012 2-in-1 Sub-Miniature Silicon Delay Line with Logic	8-Pin DIP & GULLWING 8-Pin SOIC	5 to 50ns delays Can be used as frequency doubler or combinatorial logic with delays
DS1013 3-in-1 Silicon Delay Line	8 & 14-Pin DIP & GULLWING 16-Pin SOIC	10 to 200ns delays Temperature and voltage compensated
DS1033 3-in-1 Silicon Delay Line 3.3 Volt Device	8-Pin DIP 8-Pin SOIC	8 to 50ns delays Low power, high speed and fully temperature and voltage compensated
DS1035 3-in-1 Silicon Delay Line	8-Pin DIP 8-Pin SOIC	6 to 50ns delays High speed, temperature and voltage compensated
	PROGRAMMABLE DEVICES	
DS1020 8-Bit Programmable Silicon Delay Line	16-Pin DIP 16-Pin SOIC	0.25 to 2.00ns steps Resolution to 0.25ns with a simple parallel interface
DS1040 Programmable One-Shot Pulse Generator	8-Pin DIP & GULLWING 8-Pin SOIC	5 to 500ns pulse width No external capacitors required
DS1045 4-Bit Dual Programmable Silicon Delay Line	16-Pin DIP 16-Pin SOIC	9 to 84ns delays Precise independent delays from one timing source
	***** OSCILLATORS *****	
DS1055 Crystal-Free Oscillator with Power On Reset	8-Pin DIP 8-Pin SOIC	***** NEW PRODUCT ***** Samples available 3Q94 Production available 4Q94
	Specification temp. 0° to 70°C ● Storage temp. -55°C to +125°C ● Soldering temp. 260°C for 10 seconds	

ALL SILICON DELAY LINE

ESCRIPTION

The 3D7000* series delay line is a completely silicon
lay line, which features unique circuits to compensate
- temperature and power supply variations. It offers 5
10 equally spaced taps providing delays from 5 ns to
0 ns. This series comes in a standard 14 pin DIP pack-
je, which is compatible with other standard Hybrid
lay lines. It is also offered in a 16 pin SOIC package
r surface mount technology to reduce P.C. board area.

The 3D7000* series is designed to produce both lead-
g and trailing edge delay time with equal precision.
ich tap capable of driving up to ten 74LS type loads.

Taps SERIES

Part Number		Total Delay (Ns)	Delay/Tap (ns)	Max Operating Freq (MHz)
DIP	SOIC			
*3D7005-25	**3D7005S-25	25	5	67
3D7005-30	3D7005S-30	30	6	55
3D7005-35	3D7005S-35	35	7	43
3D7005-40	3D7005S-40	40	8	41
3D7005-45	3D7005S-45	45	9	37
3D7005-50	3D7005S-50	50	10	33
3D7005-60	3D7005S-60	60	12	26
3D7005-75	3D7005S-75	75	15	22
3D7005-80	3D7005S-80	80	16	19
3D7005-100	3D7005S-100	100	20	16
3D7005-125	3D7005S-125	125	25	15
3D7005-150	3D7005S-150	150	30	11
3D7005-200	3D7005S-200	200	40	8
3D7005-225	3D7005S-225	225	45	7
3D7005-250	3D7005S-250	250	50	6
3D7005-300	3D7005S-300	300	60	8
3D7005-400	3D7005S-400	400	80	7
3D7005-500	3D7005S-500	500	100	6

0 Taps SERIES

Part Number		Total Delay (Ns)	Delay/Tap (ns)	Max Operating Freq (MHz)
DIP	SOIC			
*3D7010-50	**3D7010S-50	50	5	67
3D7010-60	3D7010S-60	60	6	55
3D7010-75	3D7010S-75	75	7.5	43
3D7010-80	3D7010S-80	80	8	41
3D7010-90	3D7010S-90	90	9	37
3D7010-100	3D7010S-100	100	10	33
3D7010-125	3D7010S-125	125	12.5	26
3D7010-150	3D7010S-150	150	15	22
3D7010-175	3D7010S-175	175	17.5	19
3D7010-200	3D7010S-200	200	20	16
3D7010-250	3D7010S-250	250	25	15
3D7010-300	3D7010S-300	300	30	11
3D7010-400	3D7010S-400	400	40	8
3D7010-450	3D7010S-450	450	45	7
3D7010-500	3D7010S-500	500	50	6

* Patented
** 1st Tap Delay = 7 ± 1 ns

FEATURES

- **High operating frequency (100MHz)**
- **Very low ground-bounce noise.**
- **Voltage & temperature compensated.**
- **Auto-insertable**
- **TTL/CMOS compatible, Low power CMOS.**
- **Vapor phase, IR and wave solderable.**

SPECIFICATIONS

- Standard 14 pin DIP & 16 pin SOIC.
- Leading & trailing edge accuracy.
- Delay tolerance: ±5% or ±2ns, whichever is greater (others on request).
- Custom delays available: Any increment from 5 to 50 ns not listed.
- Minimum input pulse width: 20% of total delay.

PART NUMBER MAKE-UP

3D70 XX X — XXX X

SERIES

TAPS
05 - 5 TAPS
10 - 10 TAPS

CASE TYPE
Blank – 14 pin DIP
S – 16 pin SOIC (300 MIL)
K – NC pins SHEARED
G – 14 pin GULL-WING

Total Delay (ns)

GRADE
Blank – Commercial
I – Industrial

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data delay devices
3 Mt. Prospect Avenue, Clifton, New Jersey 07013
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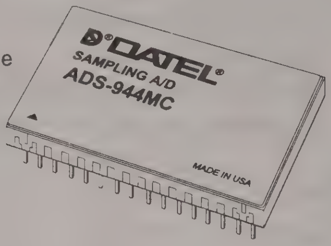
NEW PRODUCTS

14-bit, 5MHz Sampling A/D

Model ADS-944

- No missing codes over temperature
- Sampling to Nyquist frequencies
- –80dB peak harmonics, 78dB SNR
- Functionally complete
- Edge triggered
- Small, 32-pin TDIP package
- Low power, 2.9 Watts
- Commercial & military temperature ranges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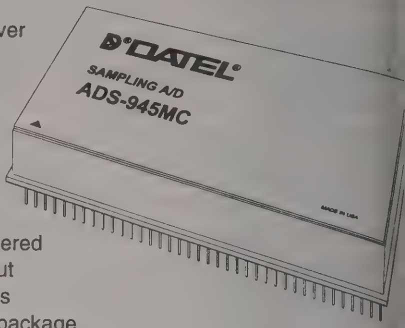
SAMPLING A/D
ADS-944MC
MADE IN USA

14-bit, 10MHz Sampling A/D

Model ADS-945

- No missing codes over temperature
- Sampling to Nyquist frequencies
- –82dB peak harmonics,
- 77dB SNR
- Functionally complete, edge triggered
- Buffered 100kΩ input
- Low power, 4.9 Watts
- Custom 2" x 4" DIP package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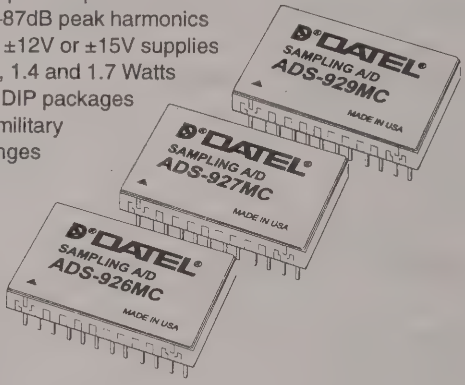
SAMPLING A/D
ADS-945MC
MADE IN USA

14-bit, 0.5, 1 and 2MHz Sampling A/D's

Models ADS-926, ADS-927 and ADS-929

- No missing codes over temperature
- Sampling to Nyquist frequencies
- –92, –91, and –87dB peak harmonics
- Operation from ±12V or ±15V supplies
- Low power, 1.3, 1.4 and 1.7 Watts
- Small, 24-pin DDIP packages
- Commercial & military temperature ranges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SAMPLING A/D
ADS-929MC
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ADS-927MC
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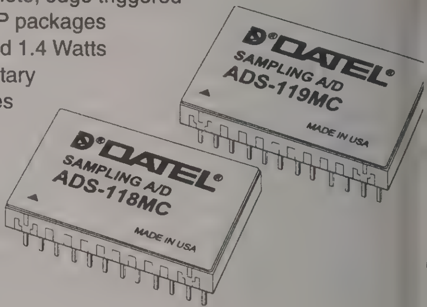
ADS-926MC
MADE IN USA

12-bit, 5 and 10MHz Sampling A/D's

Models ADS-118 and ADS-119

- No missing codes over temperature
- Sampling to Nyquist frequencies
- –75 and –72dB harmonics, 70 and 67dB SNR's
- Functionally complete, edge triggered
- Small, 24-pin DDIP packages
- Low power, 1.3 and 1.4 Watts
- Commercial & military temperature ranges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ADS-119MC
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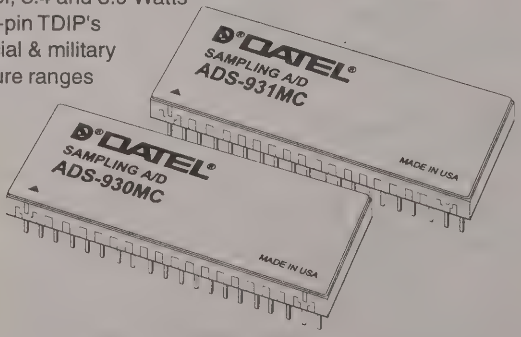
SAMPLING A/D
ADS-118MC
MADE IN USA

16-bit, 0.5 and 1MHz Sampling A/D's

Models ADS-930 and ADS-931

- No missing codes
- Sampling to Nyquist Frequencies
- –90 and –91dB peak harmonics
- Low power, 3.4 and 3.9 Watts
- Small, 40-pin TDIP's
- Commercial & military temperature ranges
- Low cost!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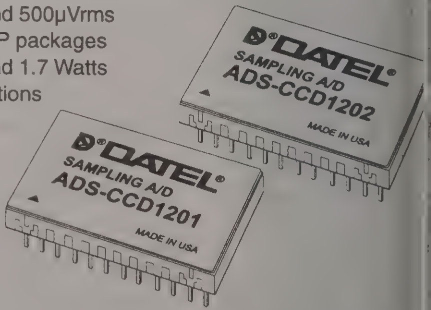
12-bit, 1.2 and 2MHz Sampling A/D's Optimized for Electronic Imaging

Models ADS-CCD1201 and ADS-CCD1202

- ±1/4 and ±3/8LSB differential nonlinearities
- Full scale step response with 1 count error
- Immune to input overvoltage saturation
- Low noise, 300 and 500μVrms
- Small, 24-pin DDIP packages
- Low power, 1.3 and 1.7 Watts
- Internal CDS functions on the way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SAMPLING A/D
ADS-CCD1201
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Data Acquisition Components

mpling Analog-to-Digital Converters

del	Resolution (Bits)	Throughput Rate (MHz)	DNL Error (LSB)	INL Error (LSB)	NMC (Bits)	BW (MHz)	Peak Harmonics (–dB)	SINAD (dB)	SNR w/o Distortion (dB)	Power (Watts)	Package
S-111	12	0.5	±1/2	±1/2	12	2	70	—	—	1.4	24-pin DDIP
S-112	12	1.0	±1/2	±1/2	12	10	81	70	72	1.3	24-pin DDIP
S-117	12	2.0	±1/2	±1/2	12	10	81	70	72	1.6	24-pin DDIP
S-118/118A	12	5.0	±3/4	±1 1/2	12	20	75	70	72	1.3	24-pin DDIP
S-119	12	10.0	±3/4	±1	12	60	72	67	70	1.4	24-pin DDIP
S-193	12	1.0	±3/4	±3/4	12	10	81	70	72	1.3	40-pin TDIP
S-CCD1201	12	1.2	±1/8	±1/4	12	7	82	71	72	1.3	24-pin DDIP
S-CCD1202	12	2.0	±3/8	±3/8	12	6	87	77	78	1.7	24-pin DDIP
S-132	12	2.0	±3/4	±1/2	12	16	81	70	72	2.9	32-pin TDIP
S-131	12	5.0	±1 1/2	±2	12	65	70	66	70	3.6	40-pin TDIP
S-130	12	10.0	±1	±1	12	65	70	66	70	3.8	40-pin TDIP
S-924	14	0.3	±1/2	±1/2	14	2	76	—	—	1.4	24-pin DDIP
S-916/926	14	0.5	±1/2	±1/2	14	7	92	79	80	1.3	24-pin DDIP
S-928	14	0.5	±1/2	±1/2	14	6	88	80	88	3.1	32-pin TDIP
S-917/927	14	1.0	±1/2	±1/2	14	7	91	78	79	1.4	24-pin DDIP
S-941	14	1.0	±1/4	±1/2	14	6	92	81	90	2.8	32-pin TDIP
S-942/942A	14	2.0	±1/2	±1/2	14	6	92	80	85	2.4	32-pin TDIP
S-929	14	2.0	±1/2	±1/2	14	6	87	77	78	1.7	24-pin DDIP
S-944	14	5.0	±1/2	±1/2	14	20	80	78	81	2.9	32-pin TDIP
S-945	14	10.0	±1/2	±1/2	14	100	82	77	81	4.9	Custom DIP
S-930	16	0.5	±3/4	±1	16	2	90	83	87	3.4	40-pin TDIP
S-931	16	1.0	±3/4	±1	16	2	91	83	87	3.9	40-pin TDIP

aluation boards available for all Sampling A/D's

alog-to-Digital Converters

del	Resolution (Bits)	Conversion Time (ns)	DNL Error (LSB)	INL Error (LSB)	NMC (Bits)	Input Range (V)	Power Supplies (V)	Power (Watts)	Package
C-207	7	50	±0.3	±0.8	7	0 to +5	+5	0.250	18-pin DIP
C-208	8	50	±1/2	±1/2	8	0 to +5	+5	0.660	24-pin DDIP
C-228	8	50	±1/2	±1/2	8	0 to +5	±15, +5	1.5	24-pin DDIP
C-304	8	50	±1/2	±1/2	8	–2, +3 to +5	±5 or +5	0.390	28-pin DDIP
C-317	8	8	±1/2	±1/2	8	0 to –2	–5	0.870	42-pin DDIP
C-530	12	350	±1/2	±1/2	12	+10, +20, ±10	±15, +5	2.1	32-pin TDIP
C-511	12	1000	±1/2	±1/2	12	+10, ±5	±15, +5	0.925	24-pin DDIP
C-914	14	2400	±1/2	±1/2	14	+10, ±5	±15, +5	0.925	24-pin DDIP
C-908	14	1000	±1/4	±1/2	14	+10, +20, ±5	±15, +5	2.7	32-pin TDIP

mple-Hold Amplifiers

del	Linearity (%)	Acquisition Time (ns)	Input Range (V)	Aperture Delay (ns)	Aperture Jitter (ps)	Gain	Bandwidth (MHz)	Hold Mode Droop (μV/μs)	Power Dissipation (mW)	Package
IM-20	0.01	1000	±10	30	1000	+1	2	0.8	330	14-pin DIP
IM-30	0.01	500	±10	–25	100	+1	4.5	0.01	735	14-pin DIP
IM-40	0.1	40	±2.5	3	10	+1	40	100	1800	24-pin DDIP
IM-43	0.01	25	±2	5	1	+1	150	1	545	14-pin DIP
IM-45	0.01	160	±10	6	50	–0.5, –1, –2	16	0.5	730	24-pin DDIP
IM-4860	0.01	160	±10	6	50	–1	16	0.5	730	24-pin DDIP
IM-49	0.01	160	±10	10	25	–1	16	0.5	365	8-pin MINI
IM-91 (dual)	0.002	2000	±10	15	300	+1	2	5	700	24-pin DDIP
IM-945	0.001	400	±10	5	10	–1	16	0.5	305	24-pin DDIP
H-840 (Quad)	0.01	775	±10	6	15	–1	13	1	2250	32-pin TDIP

(x10 option CH 3 & 4)

brid Data Acquisition Systems

del	Resolution (Bits)	Input Channels	Throughput Rate (kHz)	DNL Error (LSB)	INL Error (LSB)	Input Range (V)	Input Impedance (Ω)	Power Supplies (V)	Power Dissipation (W)	Package
AS-8/16	12	8SE/4DE	50	±3/4	±3/4	±0.1 to ±10	10^{12}	±15, +5	1.45	62-pin QDIP
AS-75/76	12	8SE/4DE	75	±3/4	±3/4	±0.1 to ±10	10^{12}	±15, +5	0.500	40-pin DDIP
AS-534/538	12	8SE/4DE	250	±3/4	±3/4	±0.1 to ±10	10^{12}	±15, +5	2.6	40-pin DDIP
AS-524/528	12	8SE/4DE	400	±3/4	±3/4	±0.1 to ±10	10^{12}	±15, +5	2.6	40-pin DDIP

ntact DATEL for availability of MIL-STD-883 devices

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For immediate assistance: **1-800-233-2765**

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Data Acquisition Component

Multiplexers

Model	Channels	Settling Time to 0.01% (μs)	Access Time (ns)	Input Range (V)	On Resistance (Ω)	Off Channel Input Leakage (pA)	On Channel Input Leakage (pA)	Power (mW)	Power Supplies (V)	Package
MX-826	8 SE	0.225 (400ns to 0.003%)	70	±10	2500	—	—	395	±15,+5	24-pin DD
MX-850	4 SE	0.050 (100ns to 0.001%)	20	±10	18 to 70	20	400	207	±15,+5	14-pin DI
MV-808	8 SE	2.8	350	±15	250	20	100	55	±15	16-pin DI
MV-1606	16 SE	2.4	300	±15	270	30	1000	105	±15	28-pin DI
MVD-409	4 DE	2.8	350	±15	250	20	50	55	±15	16-pin DI
MVD-807	8 DE	2.4	300	±15	270	30	1000	105	±15	28-pin DI
MX-808	8 SE	3.0	500	±15	1500	30	100	105	±15	16-pin DI
MX-818	8SE/4DE	3.0	400	±15	750	50	100	540	±15	18-pin DI
MX-1606	16 SE	3.0	500	±15	1500	30	100	105	±15	28-pin DI
MX-1616	16 SE	0.800	150	±15	750	10	40	900	±15	28-pin DI
MXD-409	4 DE	3.0	500	±15	1500	30	100	105	±15	16-pin DI
MXD-807	8 DE	3.0	500	±15	1500	30	100	105	±15	28-pin DI

Amplifiers

Model	DC Open Loop Gain (V/V)	Settling Time to 0.01% (ns)	Slew Rate (V/μs)	Gain Bandwidth (MHz)	Input Offset Error (mV)	Operating Amplifier Type	Power Supply Range (V)	Package
AM-500	10^6	200	1000	130	±0.5	Operational	±10 to ±18	14-pin DIP
AM-1435	10^5	70	300	1000	±2	Operational	±12 to ±16	14-pin DIP
AM-551	—	3μs	23	0.6	±1	Instrumentation	±5 to ±18	16-pin DIP

Datel

Tuneable Low-Pass Active Filters

Model	Poles	Filter Type	Low Pass	High Pass	Band Pass	Band Reject	Rolloff (dB/Octave)	Frequency Cutoff Range (f_c)	Gain	Package
FLT-C1	7	CH	•				52	78Hz-20kHz	1, 2, 4, 8	32-pin DIP
FLJ-D Series	2	BU,CH,BE	•	•	•	•	12	1Hz-159kHz	1-10	40-pin QDIP
FLJ-D5/D6 Series	5/6	CA	•				60/80	10Hz-20kHz	0 ±0.3dB	40-pin QDIP
FLJ-V Series	2, 4	BU	•	•	•		12, 24	20Hz-100kHz	0 ±0.5-1dB	40-pin QDIP
FLJ-R Series	3-8	CA	•				100-135	10Hz-20kHz	0 ±0.1dB	40-pin QDIP
FLJ-UR Series	1, 2, 4	BU,CH	•	•	•	•	12, 24, 42	40Hz-20kHz	0 ±1-3dB	20-pin SIP
FLT-U2	2	BU,CH,BE,CH	•	•	•		12	0.001Hz-200kHz	0.1-1000	16-pin DIP

BU = Butterworth CH = Chebyshev CA = Cauer/Elliptical BE = Bessel

Digital-to-Analog Converters

Model	Resolution (Bits)	Settling Time (μs)	Output Mode	I_{OUT} Current (mA)	DNL Error (LSB)	INL Error (LSB)	Power Dissipation (mW)	Input Coding	Package
DAC-HF8	8	0.025	Current	+5, ±2.5	±1/2	±1/2	750	Binary	24-pin DDI
DAC-HF10	10	0.025	Current	+5, ±2.5	±1/2	±1/2	825	Binary	24-pin DDI
DAC-HF12	12	0.050	Current	+5, ±2.5	±1	±1	900	Binary	24-pin DDI
DAC-HZ12	12	3	Voltage/Current	−2, ±1	±3/4	±1/2	390	C Binary/C BCD	24-pin DDI
DAC-HK12	12	3	Voltage/Current	−2, ±1	±3/4	±1/2	700	Binary, 2C	24-pin DDI
DAC-HP16	16	15	Voltage	—	±3/4	±1/2	675	C Binary	24-pin DDI

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XWR Series
Wide Range DC/DC Converters

ingle Output

Model	V_{OUT} (Volts)	I_{OUT} (mA)	Input Range (Volts)	Efficiency (Min.)	Package (Inches)
JWR-3.3/1800-D5	3.33	1800	4.75-7	70%	2 x 1
JWR-3.3/2500-D12	3.33	2500	9-18	75%	2 x 1
JWR-3.3/1800-D48	3.33	1800	18-72	73%	2 x 1
JWR-3.3/4250-D5	3.33	4250	4.6-13.2	73%	2 x 2
JWR-3.3/4850-D12	3.33	4850	9-18	75%	2 x 2
JWR-3.3/4850-D48	3.33	4850	18-72	79%	2 x 2
JWR-5/500-D5	5	500	4.5-9	70%	DDIP
JWR-5/500-D12	5	500	9-18	70%	DDIP
JWR-5/500-D48	5	500	18-72	75%	DDIP
JWR-5/1600-D5	5	1600	4.75-7	73%	2 x 1
JWR-5/2000-D12	5	2000	9-18	79%	2 x 1
JWR-5/1800-D48	5	1800	18-72	78%	2 x 1
JWR-5/3000-D5	5	3000	4.6-13.2	78%	2 x 2
JWR-5/4000-D12	5	4000	9-18	82%	2 x 2
JWR-5/4000-D48	5	4000	18-72	81%	2 x 2
JWR-5.2/1500-D5	5.2	1500	4.75-7	73%	2 x 1
JWR-5.2/3000-D5	5.2	3000	4.6-13.2	78%	2 x 2
JWR-12/250-D5	12	250	4.5-9	72%	DDIP
JWR-12/250-D12	12	250	9-18	72%	DDIP
JWR-12/250-D48	12	250	18-72	82%	DDIP
JWR-12/665-D5	12	665	4.7-7	75%	2 x 1
JWR-12/830-D12	12	830	9-18	81%	2 x 1
JWR-12/750-D48	12	750	18-72	81%	2 x 1
JWR-12/1250-D5	12	1250	4.6-13.2	79%	2 x 2
JWR-12/1650-D12	12	1650	9-18	82%	2 x 2
JWR-12/1650-D48	12	1650	18-72	82%	2 x 2
JWR-15/200-D5	15	200	4.5-9	72%	DDIP
JWR-15/200-D12	15	200	9-18	72%	DDIP
JWR-15/200-D48	15	200	18-72	82%	DDIP
JWR-15/530-D5	15	530	4.7-7	74%	2 x 1
JWR-15/665-D12	15	665	9-18	82%	2 x 1
JWR-15/600-D48	15	600	18-72	81%	2 x 1
JWR-15/1000-D5	15	1000	4.6-13.2	80%	2 x 2
JWR-15/1300-D12	15	1300	9-18	84%	2 x 2
JWR-15/1300-D48	15	1300	18-72	84%	2 x 2

Dual Output

Model	V_{OUT} (Volts)	I_{OUT} (mA)	Input Range (Volts)	Efficiency (Min.)	Package (Inches)
BWR-5/700-D5	±5	700	4.75-7	74%	2 x 1
BWR-5/800-D12	±5	800	9-18	78%	2 x 1
BWR-5/700-D48	±5	700	18-72	77%	2 x 1
BWR-5/1500-D5	±5	1500	4.6-13.2	78%	2 x 2
BWR-5/1700-D12	±5	1700	9-36	80%	2 x 2
BWR-5/1700-D48	±5	1700	18-72	82%	2 x 2
BWR-9/850-D5	±9	850	4.6-13.2	78%	2 x 2
BWR-12/105-D5	±12	105	4.5-9	70%	DDIP
BWR-12/125-D12	±12	125	9-18	75%	DDIP
BWR-12/125-D48	±12	125	18-72	80%	DDIP
BWR-12/335-D5	±12	335	4.75-7	73%	2 x 1
BWR-12/415-D12	±12	415	9-18	82%	2 x 1
BWR-12/415-D48	±12	415	18-72	79%	2 x 1
BWR-12/625-D5	±12	625	4.6-13.2	80%	2 x 2
BWR-12/830-D12	±12	830	9-36	83%	2 x 2
BWR-12/830-D48	±12	830	18-72	82%	2 x 2
BWR-15/85-D5	±15	85	4.5-9	70%	DDIP
BWR-15/100-D12	±15	100	9-18	75%	DDIP
BWR-15/100-D48	±15	100	18-72	82%	DDIP
BWR-15/275-D5	±15	275	4.75-7	73%	2 x 1
BWR-15/330-D12	±15	330	9-18	83%	2 x 1
BWR-15/330-D48	±15	330	18-72	80%	2 x 1
BWR-15/500-D5	±15	500	4.6-13.2	81%	2 x 2
BWR-15/670-D12	±15	670	9-36	83%	2 x 2
BWR-15/670-D48	±15	670	18-72	82%	2 x 2

Triple Output

Model	V_{OUT} (Volts)	I_{OUT} (mA)	Input Range (Volts)	Efficiency (Min.)	Package (Inches)
TWR-5/1000-12/125-D5	5/±12	1000/125	4.7-7	73%	2 x 1
TWR-5/1000-12/210-D12	5/±12	1000/210	9-18	81%	2 x 1
TWR-5/1200-12/250-D48	5/±12	1200/250	18-72	81%	2 x 2
TWR-5/1500-12/250-D48	5/±12	1500/250	18-72	79%	2 x 2
TWR-5/1800-12/200-D48	5/±12	1800/200	18-72	81%	2 x 2
TWR-5/800-15/150-D5	5/±15	800/150	4.7-7	73%	2 x 1
TWR-5/1000-15/200-D12	5/±15	1000/200	9-18	82%	2 x 1
TWR-5/1000-15/250-D48	5/±15	1000/250	18-72	79%	2 x 2
TWR-5/1500-15/250-D48	5/±15	1500/250	18-72	81%	2 x 2
TWR-5/1800-15/150-D48	5/±15	1800/150	18-72	80%	2 x 2

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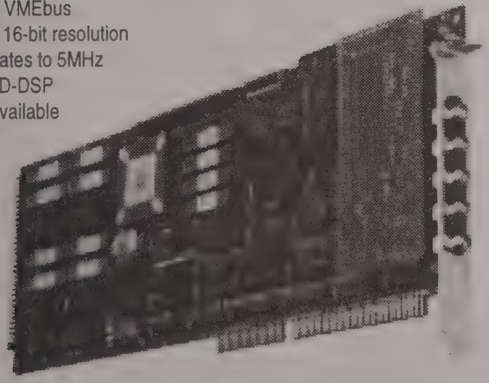

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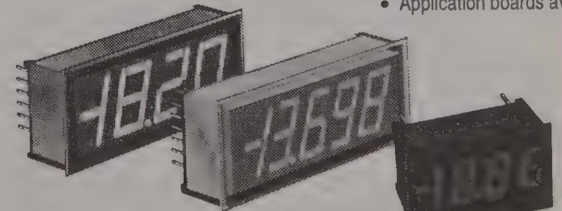

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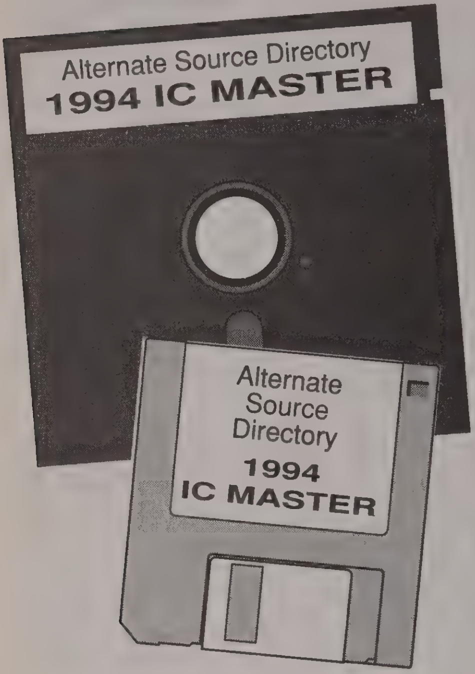

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Published annually in March

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DENSE-PAC MICROSYSTEMS, INC.

Breaking Space Barriers

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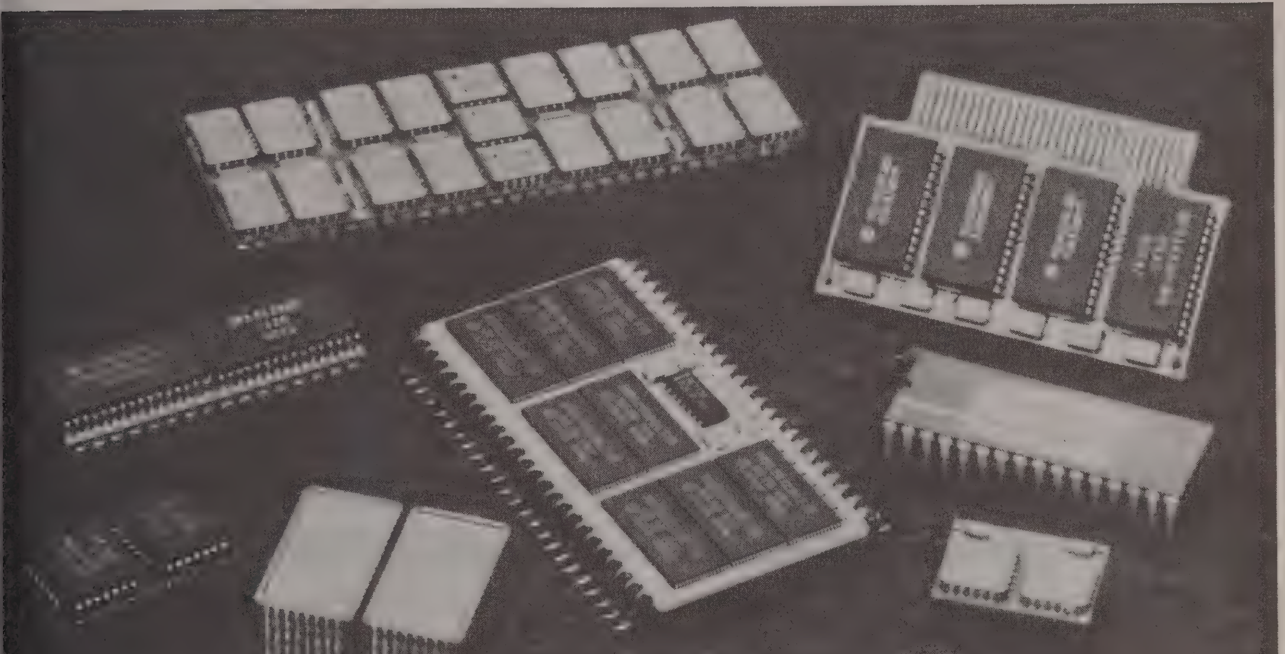

SECOND GENERATION STACKS

DENSE-PAC Microsystems, Inc.
. . . Breaking Space Barriers

SRAM PRODUCTS

DPS1MS16P/XP . . . . .2Megx8/1Megx16, 85 - 150ns, DIP/Gullwing
DPS1MS8U . . . . .1Megx8, 70 - 150ns, SIP
DPS256X24P . . . . .256Kx24/512Kx12, 25 - 45ns, DIP
DPS256S32W . . . . .1Megx8/512Kx16/256Kx32, 70 - 150ns, SIMM
DPS256X32L/W . . . . .256Kx32/512Kx16/1Megx8, 20 - 35ns, SIP/SIMM
DPS256W36L . . . . .256Kx36 / 512Kx18, 20 - 45ns, ZIP
DPS256S8AP . . . . .256Kx8, 25 - 70ns, DIP
DPS256S8P/PL/PLL . . . . . . .256Kx8, 70 - 150ns, DIP
DPS512S8AP . . . . .512Kx8, 25 - 70ns, DIP
DPS512S8EJ4/EL4/RJ4/RL4 . . . .512Kx8, 20 - 45ns, SOJ
DPS512S8H4 . . . . .512Kx8, 70 - 150ns, SOP
DPS512S8P/PL/PLL . . . . . . .512Kx8, 70 - 150ns, DIP
DPS512S8U . . . . .512Kx8, 70 - 150ns, SIP

DRAM PRODUCTS

DPD16MX8PH4 . . . . .16Meg x 8, 70 - 120, SOP

EPROM PRODUCTS

DPV12832VA . . . . .128Kx32/256Kx16/512Kx8, 120 - 250ns, PGA
DPV256S32W . . . . .1Megx8/512Kx16/256Kx32, 150 - 250ns, SIMM

FLASH PRODUCTS

DPZ128X32VTP . . . . .128Kx32/256Kx16/512Kx8, PGA
DPZ1MS16P/XP . . . . .1Megx16/2Megx8, 150 - 250ns, DIP/SOP
DPZ2MX16P/XP . . . . .2Megx16/4Megx8, 150 - 250ns, DIP/SOP

NEW PRODUCTS

DPS1MS8EJ4/EL4/RJ4/RL4 . . . .1MegX8, 25 - 45ns, SOJ

REFERENCE BY SIZE

SIZE	PART NUMBER	ORGANIZATION	SPEED (ns)	PACKAGE
SRAM PRODUCT				
2 Megabit	DPS256S8AP	256Kx8	25, 35, 45, 55, 70	32-Pin DIP
	DPS256S8P/PL/PLL	256Kx8	70, 85, 100, 120, 150	32-Pin DIP
4 Megabit	DPS512S8AP	512Kx8	25, 35, 45, 55, 70	32-Pin DIP
	DPS512S8EJ4/EL4/RJ4/RL4	512Kx8	20, 25, 30, 35, 45	32/36-Pin SOJ
	DPS512S8H4	512Kx8	70, 85, 100, 120, 150	32-Pin SOP
	DPS512S8P/PL/PLL	512Kx8	70, 85, 100, 120, 150	32-Pin DIP
	DPS512S8U	512Kx8	70, 85, 100, 120, 150	36-Pin SIP
6 Megabit	DPS256X24P	256Kx24	25, 35, 45	50-Pin DIP
8 Megabit	DPS1MS8EJ4/EL4/RJ4/RL4	1Megx8	25, 30, 35, 45	32/36-Pin SOJ
	DPS1MS8U	1Megx8	70, 85, 100, 120, 150	36-Pin SIP
	DPS256S32W	1Megx8, 512Kx16, 256Kx32	85, 100, 120, 150	64-Pin SIMM
	DPS256X32L/W	256Kx32, 512Kx16, 1Megx8	20, 25, 35	64-Pin ZIP/SIMM
9 Megabit	DPS256W36L	256Kx36, 512Kx18	20, 25, 30, 35, 45	64-Pin ZIP
16 Megabit	DPS1MS16P/XP	1Megx16, 2Megx8	85, 100, 120, 150	48-Pin DIP/GULL
DRAM PRODUCT				
128 Megabit	DPD16MX8PH4	16Megx8	70, 85, 100, 120, 150	34-Pin SOP
EPROM PRODUCT				
4 Megabit	DPV12832VA	128Kx32, 256Kx16, 512Kx8	120, 150, 170, 200, 250	66-Pin PGA
8 Megabit	DPV256S32W	1Megx8, 512Kx16, 256Kx32	150, 170, 200, 250	64-Pin SIMM
FLASH PRODUCT				
4 Megabit	DPZ128X32VTP	128Kx32, 256Kx16, 512K x 8	150, 170, 200, 250	66-Pin PGA
16 Megabit	DPZ1MS16P/XP	1Megx16, 2Megx8	150, 200, 250	50-Pin DIP/GULL
32 Megabit	DPZ2MX16P/XP	2Megx16, 4Megx8	200, 250, 300	50-Pin DIP/GULL

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INTRODUCTION

DENSE-PAC Microsystems, Inc.
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PRODUCTS

Standard and custom monolithic memories and memory/logic/analog modules manufactured since 1981.

DESIGN CAPABILITY

Dense-Pac digital and analog design engineers are in tune with your custom design requirements. We will work with you from conceptual design, through prototype, until you are satisfied with the custom part in its application. Dense-Pac's CAD system can provide short design cycles. Combined with our designers' experience in optimizing module performance in terms of minimizing parasitic impedances, Dense-Pac can supply a turn key product in an abbreviated turn-around time. Modules may be designed using PCB, thick film or co-fired ceramic substrates in DIP, SIP, ZIP or PGA configurations. Dense-Pac also has 3-dimensional packaging techniques which can be designed into custom applications where board space savings is paramount. With 10 years of custom module design behind us, we are fully prepared to satisfy your every need from circuit design to thermal analysis.

TEST CAPABILITY

Dense-Pac has made major investments in both automated test equipment (ATE) and in test software engineering. Six modern ATE testers are supplemented with two functional testers, all with temperature forcing capabilities. Attention is paid to every detail, such as measuring the exact case temperature of each module under test. To further assure the highest quality parts, limits on critical parameters are not just set at data sheet values but set at product design values to eliminate parts falling outside the normal distribution. All Dense-Pac manufactured monolithic devices are 100% parametrically tested at temperature, standard modules are 100% functionally tested at temperature. All non-standard/custom modules are tested per customer request, and all are functionally tested over temperature and fully warranted to meet specifications.

MILITARY PROCESSING CAPABILITY

Dense-Pac has full test, burn-in and environmental test capabilities to process product in accordance with the following methods from MIL-STD-883C:

Screening Capabilities

Internal Visual per Method 2010, Test Condition B
Temperature Cycle per Method 1010, Test Condition C
Thermal Shock per Method 1011, Test Condition A
Constant Acceleration per Method 2001, Test Condition E; Y1 orientation only
Three-Temperature Testing per Dense-Pac Specification or Customer S.C.D.
P.I.N.D. (optional) per Method 2020, Test Condition A
Burn-In per Method 1015, 160 Hrs. @ +125°C
Seal (Fine and Gross Leak) per Method 1014
External Visual per Method 2009

Qualification and Quality Conformance Inspection Capabilities

Resistance to Solvents per Method 2015
Solderability per Method 2022 or 2003
Bond Strength per Method 2011
Steady State Life Testing per Method 1005
Physical Dimensions per Method 2016
Lead Integrity per Method 2004 Test Condition B2 (Lead Fatigue)
Moisture Resistance per Method 1004
Mechanical Shock per Method 2002, Test Condition B
Vibration, Variable Frequency per Method 2007, Test Condition A
Salt Atmosphere per Method 1009, Test Condition A
Internal Water Vapor Content per Method 1018, 5000 ppm max. H_2O content @ +100°C

QUALITY

Dense-Pac has an absolute commitment to quality which is evident by the results of our 100% pass rate for military vendor quality surveys to MIL-I-45208. Dense-Pac has been approved as a MIL-I-45208 vendor by over 20 major U.S. defense and aerospace prime contractors and by several major overseas corporations. Dense-Pac Quality Assurance reviews all purchase orders, customer specifications, and any other applicable documentation against our drawings, test software, test procedures, travelers, etc. for each customer order. Dense-Pac maintains a complete MIL-I-45208 system for all products produced (Commercial, Industrial, and Military grades). Dense-Pac's quality system, including a complete configuration management system, has been extremely successful, evident by our level of customer satisfaction and an extremely low product return rate.

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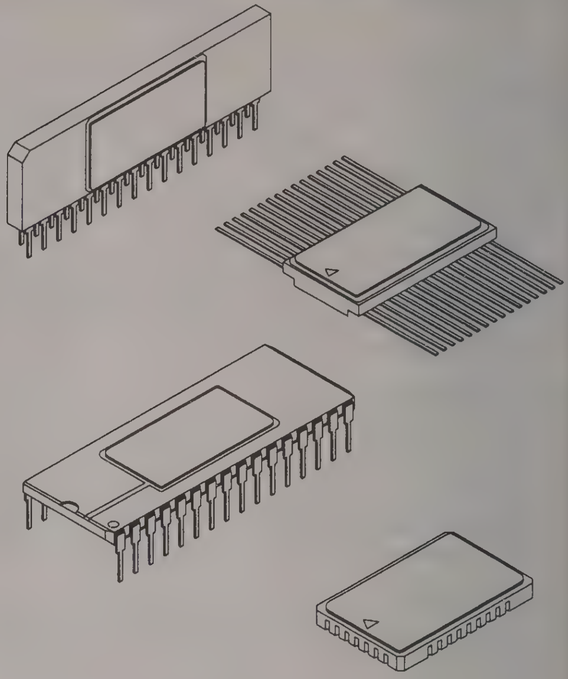
DPS128M8
CERAMIC 128K X 8 CMOS MONOLITHIC SRAM



Description

The DPS128M8 is a 128K x 8 asynchronous static RAM fabricated on a monolithic CMOS chip. It is designed for use in high-density, high-speed, low-power applications. All pins are TTL-compatible and a single +5 Volt power supply is required.

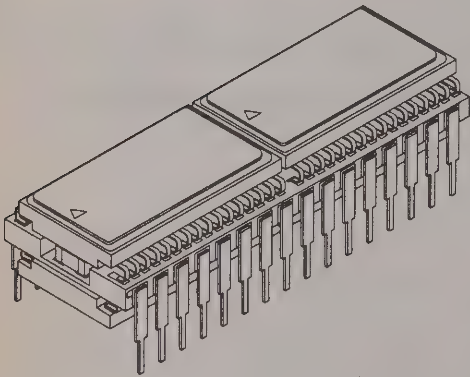
The DPS128M8 has extremely low standby power dissipation making it suitable for battery back up.

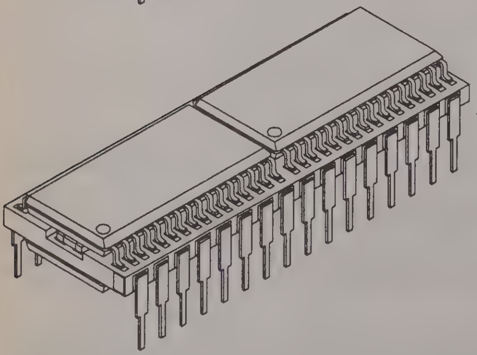
The 600-mil wide, 32-pin ceramic, dual-in-line package conforms to the JEDEC standard. Dense-Pac also offers the DPS128M8 as a space saving ceramic ZIP, ceramic leadless chip carrier and ceramic Small Outline Gullwing "flatpack" for surface-mount applications.

All Dense-Pac military monolithic packages are available screened to selected test methods from MIL-STD-883, which are further described in the Military Processing Capability section.

Features

- 131, 072 word by 8-bit organization
- Fast Access Times: 70, 85, 100, 120, 150ns
- Higher Speed (25ns to 55ns) Available 2H'91
- Low Power Dissipation - 10 µW (typ.) standby
  75 mW (typ.) operating
- 2-Volt Data Retention
- Output Enable Function
- Two Chip Enables





DPS512S8
512K X 8 CMOS SRAM MODULE
(Military and Commercial)

Description

The DPS512S8 is a 512K X 8 high-density, low-power static RAM module comprised of four 128K X 8 monolithic SRAM's, advanced, high-speed CMOS decoder and decoupling capacitors surface mounted on a co-fired ceramic substrate having side-brazed leads.

The DPS512S8 is available in a 600-mil-wide, 32-pin dual-in-line package that conforms to the same JEDEC standard pin configuration as the future JEDEC four megabit monolithics.

The DPS512S8 operates from a single +5V supply and all input and output pins are completely TTL-compatible. The low standby power of the DPS512S8 make it ideal for battery-backed applications.

Military modules are available using components screened to selected test methods from MIL-STD-883, which are further described in the Military Processing Capability section.

Features

- 524, 288 word by 8 bit configuration
- Fast Access Times:

DPS512S8AP	25, 35, 45, 55, 70ns
DPS512S8N	85, 100, 120, 150ns
DPS512S8P\PL\PLL	70, 85, 100, 120, 150ns

- Low Power Dissipation:

Standby:	40 µW (typ.)	(DPS512S8N/P)
	25 µW (typ.)	(DPS512S8PL/PLL)
	2.0 mW (typ.)	(DPS512S8AP)
Operating:	375 mW (typ.)	(DPS512S8N/P/PL/PLL)
	450 mW (typ.)	(DPS512S8AP)

- 2-Volt data retention
- All Inputs and Outputs are TTL-compatible
- Fully Static Operation - No clock or refresh required
- 600 mil, 32-pin JEDEC standard DIP pinout

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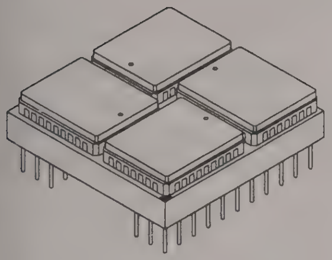
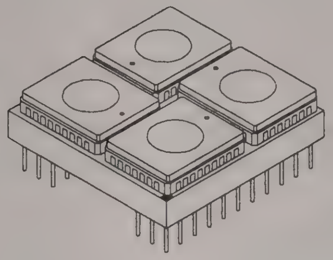
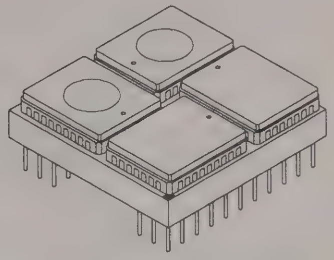
STANDARD PRODUCTS

DENSE-PAC Microsystems, Inc.
. . . Breaking Space Barriers

VERSAPAC OFFERS 32-BIT WIDE MEMORY IN ONE SQUARE INCH
SRAM / EPROM / EEPROM / FLASH EEPROM

The VERSAPAC series of memory modules consist of SRAM, EPROM, EEPROM or Flash EEPROM devices surface mounted on a co-fired ceramic PGA substrate. The VERSAPAC can be a heterogeneous combination of technology such as SRAM/EPROM or SRAM/EEPROM; or a homogeneous configuration of SRAM, EPROM, EEPROM or Flash EEPROM, on one substrate. The 32-bit wide architecture is ideal for use with the latest microprocessors and digital signal processors. The module can also be addressed in 8, 16 or 24 bit words.

Standard components available for use on the Versapac are:

SRAM	128Kx8, 32Kx8 and 8Kx8
EPROM	128Kx8 and 32Kx8 (64Kx8 in homogeneous only)
EEPROM	128Kx8, 32Kx8 and 8Kx8
Flash EEPROM	128Kx8 (64Kx8 in homogeneous only)

Advantages

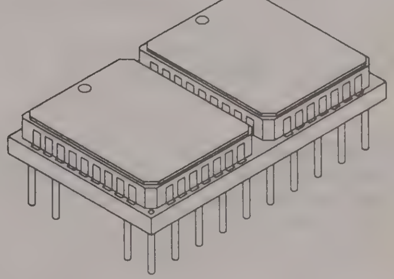
- 32-bit wide architecture.
- Most combinations of SRAM, EPROM, EEPROM or Flash EEPROM can be mixed on the same module while the pin-out connections remain constant.
- 66-PIN PGA
- Includes four 0.1µF on board bypass capacitors.
- Central lower gap can accommodate a heat rail if desired.
- Each memory device on the module can be accessed independently with its own chip enable.
- EPROM programming adaptors are available.

HALF-VERSAPACS FOR 16-BIT WIDE APPLICATIONS

The new Halfpac family of memory modules from Dense-Pac offer the same board densities and flexibility as our Versapacs, but are intended for 8 and 16-bit wide applications. Like the Versapac, a mixture of technology can be integrated on the same module (one 32Kx8 SRAM with one 128Kx8 EPROM for example), as well as 16 bits of a single technology .

Features:

- 16-bit data width.
- Supports a mixture of SRAM, EPROM, EEPROM, or FLASH EEPROM on the same module.
- 40-Pin PGA (1.009" x 0.596")
- Central 0.3" gap on the underside can accomodate a heat rail if desired.
- Each memory device can be accessed individually.



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DENSE-PAC Microsystems, Inc.
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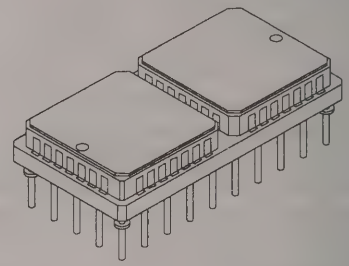
REDUCE YOUR PLD BOARD SPACE
DENSE-PAC'S PROGRAMMABLE LOGIC MODULE

The Dense-Pac Programmable Logic Module (DPLD) is a 48-pin Pin Grid Array (PGA) designed to support two "22V10" fiel programmable array logic, 22 input, 10 macrocell output devices (DPL22V10A), including decoupling capacitor, at a 50% boar space savings over conventional though hole (DIP) technology. Standard Electrically Erasable (E^2), One Time Programmable (OTP and UV erasable devices are available. Complete programmability and functional access are maintained for both devices.

The DPLD can be used to save board space with other standard PLD's, typically used in 24-Pin DIP packages and available i 28-pad LCC's, by mounting them on the module.

The DPLD module is available for military use with semiconductor components manufactured in compliance with MIL-STD-883 Class B, making it ideally suited for use in the most demanding applications requiring the highest levels of reliability an performance.

- Adapts Two Standard 22V10 PLD's in One Package
- 50% Board Space Reduction
- Easily Programmable Using Standard Equipment and Program Adapter
- Includes On Board Decoupling Capacitor
- Available in Standard CMOS E^2, OTP and UV Erasable
- Separate Clock/ Programming Inputs
- Measures Only 0.495 x 0.990 inches
- Speeds as fast as 25ns and faster as those devices become available



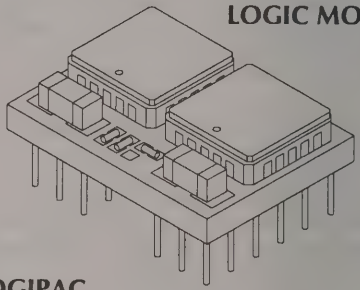
DENSE-PAC LOGIC MODULES SAVE 35% OR MORE BOARD SPACE

The Dense-Pac Logic Module (DPL's) are a family of memory support modules available in 16-bit or dual 8-bit configurations. Th DPL family will save from 35% to 50% of the logic board space typically populated by standard 20-pin DIP packages, permittin a tighter, more compact final design. The DPL's are available to support all logic families: "FCT", "F", "ACT", "HC", "HCT", "LS" an others. Various module types include dual buffers/drivers, transceivers, registers, latches, and other types of logic.

The DPL module is available for military use with semiconductor components manufactured in compliance with MIL-STD-883 Class B, making it ideally suited for use in the most demanding applications requiring the highest levels of reliability an performance.

- 35% To 50% Board Space Savings vs. Conventional DIP Packages
- Buffers/Drivers
- Transceivers
- Registers
- Latches
- Other Standard Logic Devices
- Includes On Board Decoupling Capacitors
- Pin Grid Array (PGA) Package
- CMOS and/or TTL Compatible

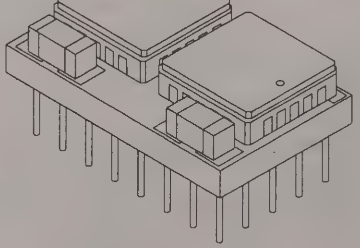
LOGIC MODULE



LOGIC MODULE

- 16 Bit Logic Support
- 35% (min.) Board Space Savings (0.590" x 0.790")
- Common Clock/Control Lines
- Heat Rail Accomodating Central Gap
- Ideal for 16 and 32 Bit Buffering

LOGIPAC



LOGIPAC

- 8 and 16 Bit Logic Support
- 50% (min.) Board Space Savings (0.490" x 0.790")
- Homogeneous/Heterogeneous Configurations
- Separate Control/Clock Lines
- Mix Logic for Your Custom Application

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STANDARD PRODUCTS DENSE-PAC Microsystems, Inc.
. . . Breaking Space Barriers

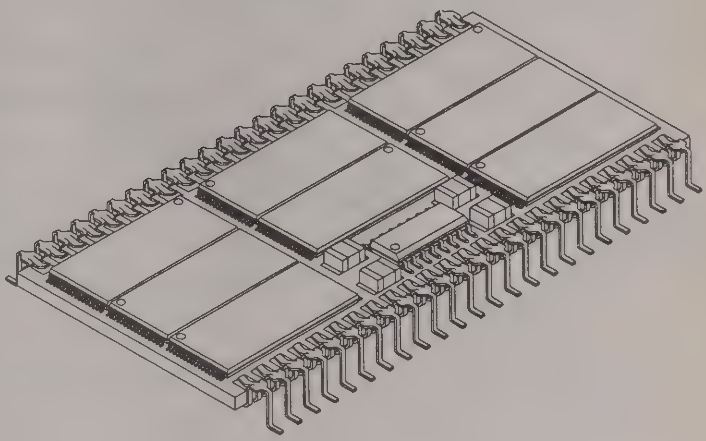
16 Megabit SRAM Module
in Surface Mount or DIP Package!

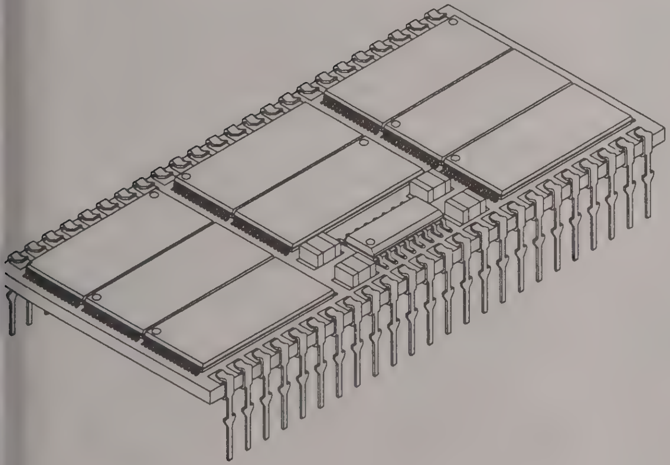
escription

he DPS1MS16P/XP is a 2048K x 8 or 1024K x 16 bit igh-density, low-power static RAM module consisting of 6 individual, ultra low-power, 128K x 8 CMOS SRAMs ackaged in Thin Small Outline Packages (TSOPs).

y using TSOPs and advanced surface-mount techniques, he Dense-Pac DPS1MS16P/XP memory module offers igh density packaging for both surface mount and hrough-hole applications. The low power RAMs are apable of retaining data at only two volts while drawing ypically only 16 μA of current making the PS1MS16P/XP ideal for battery backed applications.

he DPS1MS16P/XP is the first in a family of commercial rade memory modules that takes advantage of the space avings gained by employing TSOP packages.





Features

- 1024K by 16 or 2048K by 8 Bit Configuration
- Fast Access Times: 85, 100, 120, 150ns
- Low Power CMOS Design
- 2-Volt Data Retention
- 48-pin Flat Pack or Dual-Inline Package
- All Inputs and Outputs TTL Compatible
- Industrial Screening Available
- 2.50" x 1.20" x 0.24"

OTE FOR SURFACE MOUNT VERSION: The module's ceramic substrate allows the use of a high temperature solder (240°C or mounting the TSOP components and 300°C for lead attach) in constructing the module. This assures that the module will not tself re-flow during the process of attaching it to a surface mount P.C.B.

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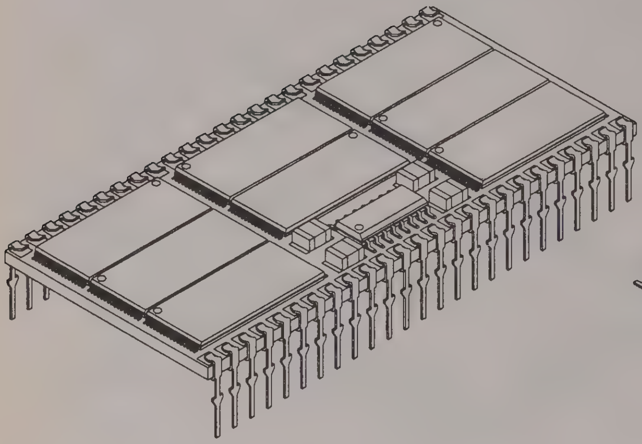
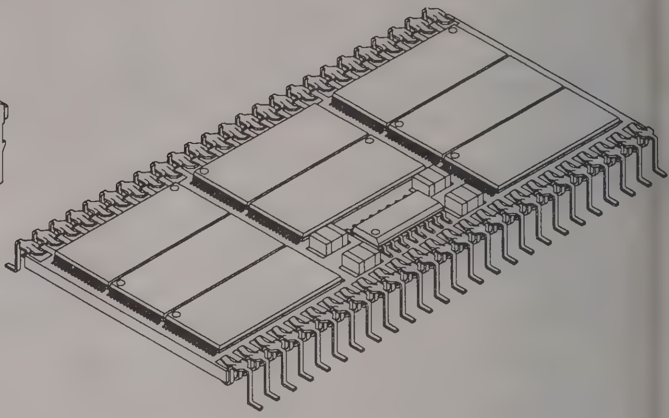
16/32 Megabit FLASH EEPROM Module in Surface Mount or DIP Package!





Description

The DPZ1MS16P and DPZ2MS16P are 16 megabit and 32 megabit respectively, CMOS FLASH Electrically Programmable and Erasable nonvolatile memory modules. The module is built with sixteen, 128K x 8 (DPZ1MS16P) or sixteen 256K x 8 (DPZ2MS16P) FLASH memory devices and 2 high speed decoders. The DPZ1MS16P can be user configurable as 1024K x 16 or 2048K x 8 bits, while the DPZ2MS16P can be user configurable as 2048K x 16 or 4096K x 8 bits.

By using TSOPs and advanced surface-mount techniques, the Dense-Pac DPZ1MS16P is able to attain a density of over 5 Megabits per square inch of board space while maintaining a low profile (0.200" max.) and the DPZ2MS16P is able to attain a density of over 10 Megabits per square inch. The modules are available with either through-hole leads (DPZ1MS16P/DPZ2MS16P), or surface mount leads (DPZ1MS16XP/DPZ2MS16XP).

The DPZ1MS16P and DPZ2MS16P are ideal for use in systems that require periodic code updates, or for use as a high speed nonvolatile storage medium.

Features

- Organizations:
  - 1024K x 16 or 2048K x 8 (DPZ1MS16P/XP)
  - 2048K x 16 or 4096K x 8 (DPZ2MS16P/XP)
- Fast Read Access Times:
  - 150, 200, 250ns (DPZ1MS16P/XP)
  - 200, 250, 300ns (DPZ2MS16P/XP)
- Low Power:
  - 75mA Maximum Active (16 bit Mode)
  - 45mA Maximum Active (8 bit Mode)
  - 1.6mA Maximum Standby
- 10,000 Erase/Program Cycles Minimum
- Command Register Architecture for Microprocessor Compatible Write Interface
- 12.0V ± 5% V_{PP}
- TTL Compatible Inputs and Outputs
- 50-pin Flat Pack or Dual-Inline Package
- 2.50" x 1.20" x 0.24"

NOTE FOR SURFACE MOUNT VERSION: The module's ceramic substrate allows the use of a high temperature solder (240°C for mounting the TSOP components and 300°C for lead attach) in constructing the module. This assures that the module will not itself re-flow during the process of attaching it to a surface mount P.C.B.

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f you can't find a module to suit your application, a custom module may be the answer.
ill out the form below, and we will make a recommendation.

Custom Module
Request for Quote

Customer Name:	
Contact:	
Telephone:	Date Requested:
FAX:	Date Required:

MODULE INFORMATION

1.	Type: *(SRAM, EEPROM, EPROM Flash, etc.)*	
2.	Amount of Memory per Module:	
3.	Amount of Memory per Board/System:	
4.	Speed:	
5.	Grade: *(Commercial, Military, etc):*	
6.	Width of Data Bus:	
7.	Special Test Requirements:	
8.	Special Power Requirements:	
9.	Board Space: *(L x W x H)*	
10.	Form Factor: *(DIP, PGA, F/P, ZIP, etc.)*	
11.	Application:	
12.	Quantity / yr.: *(Boards / Systems)*	
13.	Delivery / Time Frame:	
14.	Special Configuration Information: *(Attach)*	
15.	Other:	

Please call your local representative *(see page 18 - 19)* with this information and we will propose a solution, either with existing hardware or with a custom design.

DENSE-PAC MICROSYSTEMS, INC.

. . . Breaking Space Barriers

First Generation 3-D Stack Technology

3-D Stack Technology Features:

HIGH MEMORY DENSITY -

THE FIRST GENERATION STACK FAMILY OF MODULES OFFERS A HIGHER BOARD DENSITY OF MEMORY THAN AVAILABLE WITH CONVENTIONAL THROUGH-HOLE, SURFACE MOUNT, MODULE, OR HYBRID TECHNIQUES.

VERTICALLY EXPANDABLE MEMORY (VEM) -

INCREASE YOUR MEMORY UP TO EIGHT TIMES WITH NO PC BOARD CHANGES.

REDUCED PARASITICS -

THE PHYSICAL DISTANCE SIGNALS MUST TRAVEL BETWEEN IC's IS DRAMATICALLY REDUCED, THEREBY REDUCING PARASITIC IMPEDANCES.

SURFACE MOUNT OR THROUGH-HOLE -

CURRENTLY AVAILABLE ON 50 OR 66 PIN GRID ARRAY SUBSTRATES OR WITH 48 PIN "J" OR "GULL" LEAD SURFACE MOUNT PINOUTS.

SRAM OR FLASH EEPROM -

AVAILABLE IN EITHER 1MB SRAM OR 1MB FLASH. 4MB SRAM, 8MB FLASH, 16MB DRAM AND VIDEO RAM AVAILABLE IN THE NEAR FUTURE.

MECHANICALLY RUGGED -

DESIGNED INTO SPACE, AIRBORNE AND NUMEROUS OTHER HOSTILE INDUSTRIAL ENVIRONMENTS.

EXCELLENT THERMAL CHARACTERISTICS -

SEE THERMAL ANALYSIS ON PAGE 8.

FULLY TESTED AND SCREENED SUB-SYSTEM -

TESTED AND SCREENED TO COMMERCIAL, INDUSTRIAL, MILITARY, B-GRADE OR SOURCE CONTROL DRAWINGS.

3-D STACK TECHNOLOGY

DENSE-PAC Microsystems, Inc.
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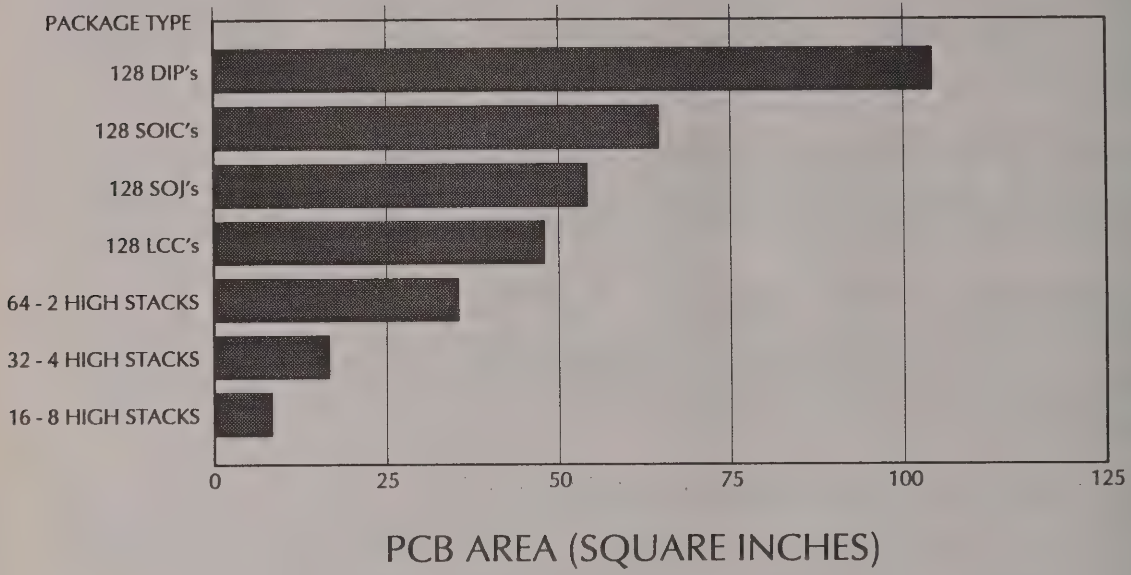
Dense-Pac

DENSITY COMPARISONS

COMPARISONS OF PCB SPACE REQUIRED FOR A 16 MEGABYTE SRAM SYSTEM FOR DIFFERENT PACKAGE TYPES



STACK TECHNOLOGY REDUCES TOTAL SYSTEM COSTS:

SMALLER BOARD SIZE

REDUCED BOARD COMPLEXITY

IMPROVED PARASITIC IMPEDENCES

EASIER BOARD/SYSTEM LEVEL REWORK

REDUCED OPPORTUNITY OF DESIGN ERRORS

MORE THOROUGH TESTING & PROCESSING

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STACKABLE LEADLESS CHIP CARRIER (SLCC) THE KEY TO DENSE-STACK TECHNOLOGY

SURFACE MOUNT TECHNOLOGY

LEADS ON TOP, SIDE AND BOTTOM

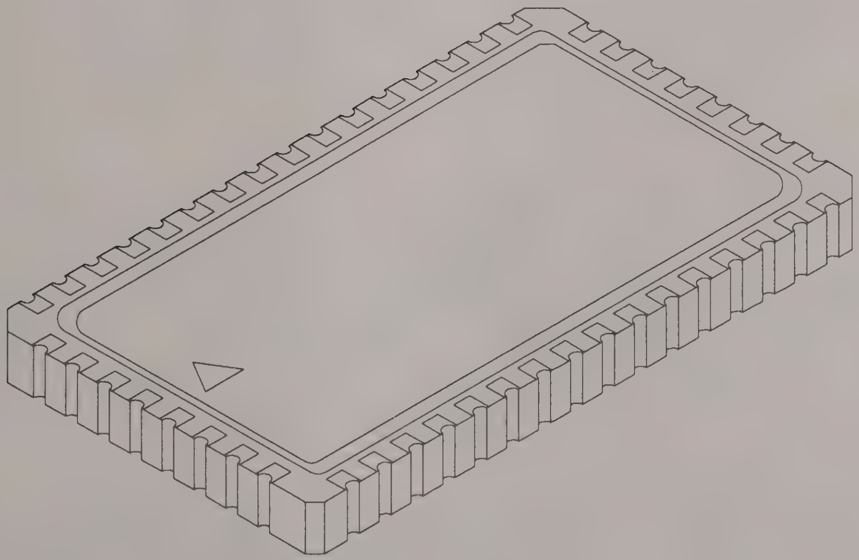
HERMETICALLY SEALED

OPERATES OVER FULL MILITARY TEMPERATURE RANGE

TYPICALLY HOLDS ONE I.C. (CAN ACCEPT MULTIPLE)

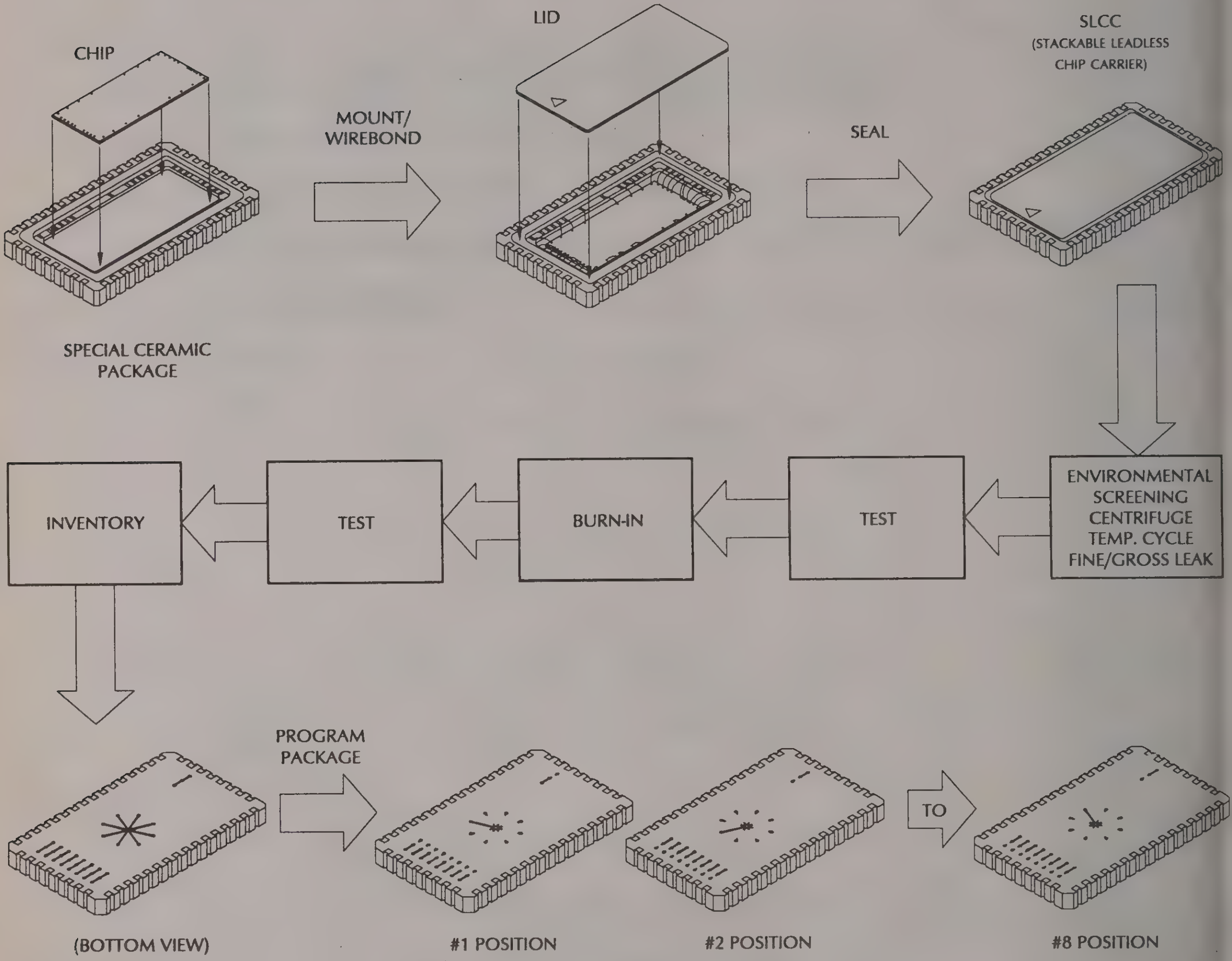
SMALL SIZE

A PROGRAMMABLE PACKAGE



3-D STACK ASSEMBLY FLOW

STACKABLE LEADLESS CHIP CARRIER (SLCC)


CHIP
SPECIAL CERAMIC PACKAGE
MOUNT/ WIREBOND
LID
SEAL
SLCC (STACKABLE LEADLESS CHIP CARRIER)
ENVIRONMENTAL SCREENING CENTRIFUGE TEMP. CYCLE FINE/GROSS LEAK
TEST
BURN-IN
TEST
INVENTORY
PROGRAM PACKAGE
(BOTTOM VIEW)
#1 POSITION
#2 POSITION
TO
#8 POSITION

THE STACKABLE LEADLESS CHIP CARRIER (SLCC) SHOWN ABOVE, IS A PROGRAMMABLE PACKAGE. THE SLCC IS PROGRAMMED FOR THE POSITION IT WILL OCCUPY IN THE STACK. THE BOTTOM VIEW, SHOWN ABOVE, SHOWS A WHEEL WITH EIGHT SPOKES. THE HUB OF THE WHEEL IS CONNECTED TO CHIP ENABLE (OR CAS) OF THE CHIP. EACH SPOKE OF THE WHEEL GOES TO A DIFFERENT EXTERNAL SLCC PAD LOCATION. CUTTING ALL BUT ONE SPOKE WILL PROGRAM THE SLCC FOR A SPECIFIC STACK LOCATION. THE OTHER TRACES ARE FOR HIGH CHIP ENABLE AND I/O ASSIGNMENTS.

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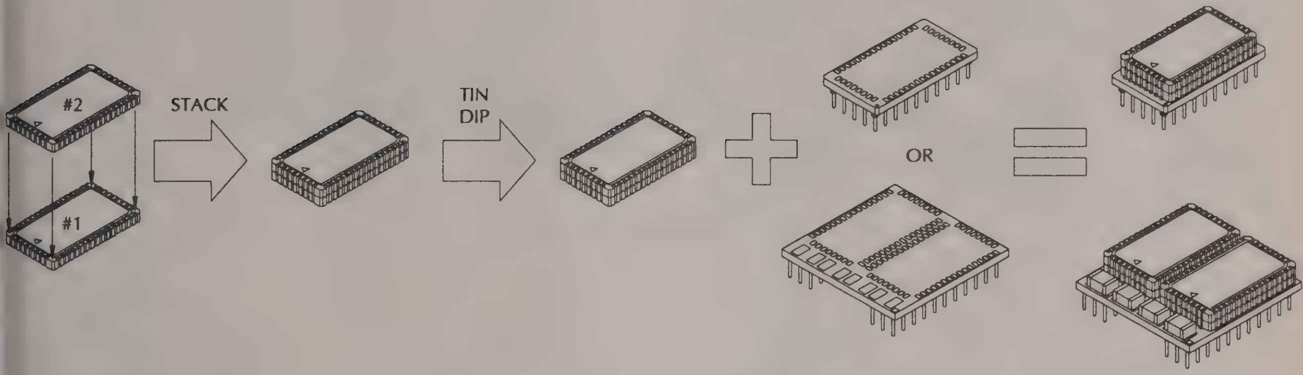
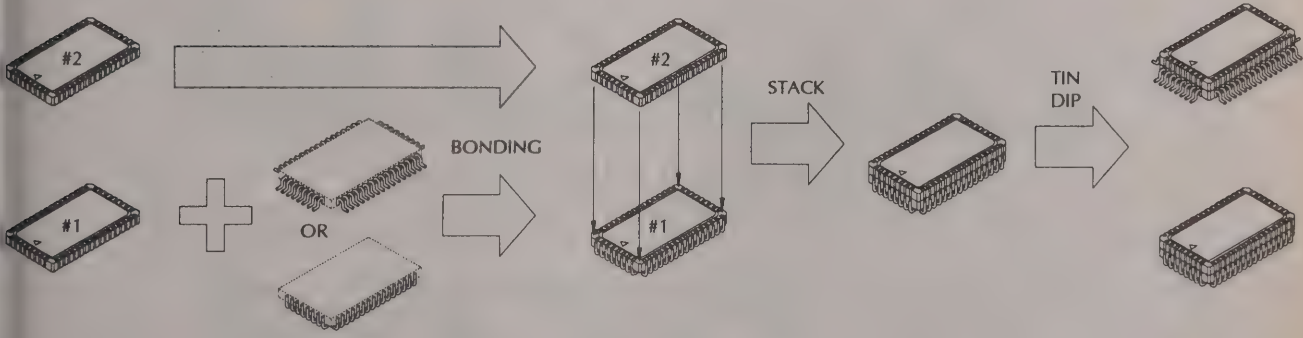
3-D STACK ASSEMBLY FLOW

THROUGH-HOLE PGA SUBSTRATE


#2
#1
STACK
TIN
DIP
OR

SURFACE MOUNT "J" AND "GULL" LEAD


#2
#1
BONDING
OR
#2
#1
STACK
TIN
DIP

Dense-Pac

3-D STACK TECHNOLOGY

DENSE-PAC Microsystems, Inc.
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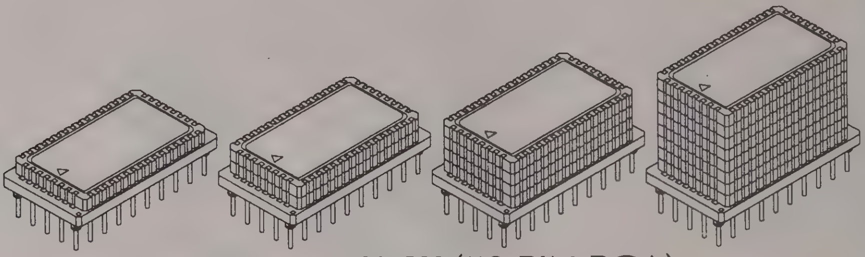
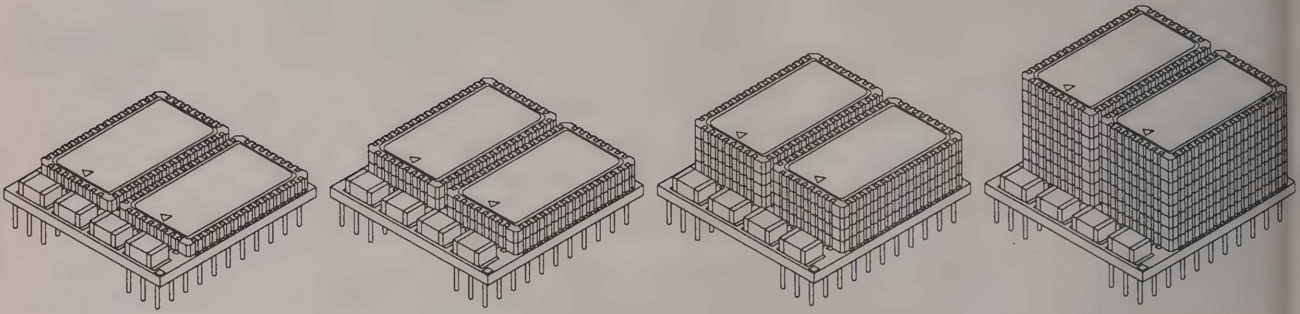
VERTICALLY EXPANDABLE MEMORY (VEM)

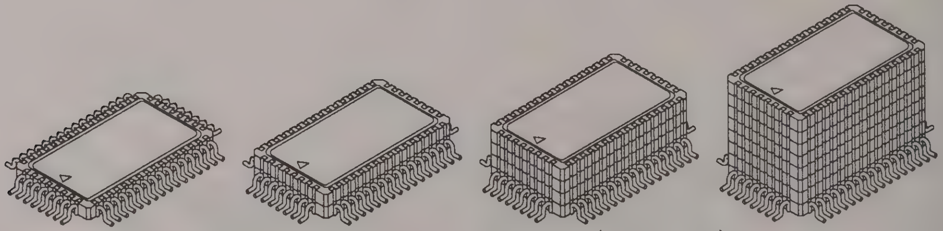
START OUT WITH ANY OF THE FOUR FOOTPRINTS SHOWN BELOW AND **INCREASE YOUR MEMORY UP TO EIGHT TIMES WITH NO PC BOARD CHANGES ! ! !**



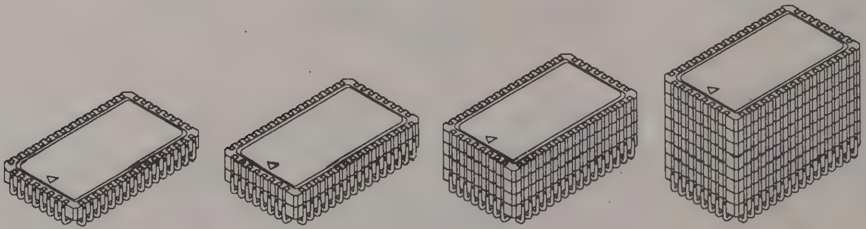
SINGLE STACK (50 PIN PGA)



DOUBLE STACK (66 PIN PGA)



"GULL" LEAD STACK (48 PIN)



"J" LEAD STACK (48 PIN)

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STACKING TECHNOLOGY VITAL STATISTICS

	PGA DENSE-STACK	PGA VERSA-STACK	"J" LEADED STACK	"GULL" LEADED STACK	"I" LEADED STACK
DIMENSIONS (inches):	(W x L x H)	(W x L x H)	(W x L x H)	(W x L x H)	(W x L x H)
1 HIGH	0.540 x 0.990 x 0.205	1.090 x 1.090 x 0.203	0.520 x 0.890 x 0.142	0.605 x 0.975 x 0.110	0.520 x 0.890 x 0.082
2 HIGH	0.540 x 0.990 x 0.294	1.090 x 1.090 x 0.292	0.520 x 0.890 x 0.230	0.605 x 0.975 x 0.184	0.520 x 0.890 x 0.171
4 HIGH	0.540 x 0.990 x 0.472	1.090 x 1.090 x 0.470	0.520 x 0.890 x 0.409	0.605 x 0.975 x 0.362	0.520 x 0.890 x 0.349
8 HIGH	0.540 x 0.990 x 0.828	1.090 x 1.090 x 0.826	0.520 x 0.890 x 0.765	0.605 x 0.975 x 0.718	0.520 x 0.890 x 0.707
AREA (square inches.):					
1 HIGH	0.535	1.188	0.463	0.731	0.463
2 HIGH	0.535	1.188	0.463	0.731	0.463
4 HIGH	0.535	1.188	0.463	0.731	0.463
8 HIGH	0.535	1.188	0.463	0.731	0.463
VOLUME 1 (cubic inches):					
1 HIGH	0.110	0.241	0.066	0.069	0.066
2 HIGH	0.157	0.347	0.106	0.135	0.106
4 HIGH	0.253	0.558	0.189	0.265	0.189
8 HIGH	0.443	0.981	0.354	0.525	0.354
VOLUME 2 (cc):					
1 HIGH	1.800	3.958	1.079	1.140	1.079
2 HIGH	2.581	5.693	1.748	2.207	1.748
4 HIGH	4.144	9.163	3.108	4.342	3.108
8 HIGH	7.269	16.103	5.812	8.613	5.812
WEIGHT (grams):					
1 HIGH	5.0	9.5	3.0	3.0	3.0
2 HIGH	7.0	13.5	5.0	5.0	5.0
4 HIGH	11.0	21.5	9.0	9.0	9.0
8 HIGH	19.0	37.5	17.0	17.0	17.0

* ALL VALUES ARE MAX.

VERSA-STACK SHOCK AND VIBRATION DATA

Five samples of DPS512X32V3 Versa-Stacks, consisting of two 8-high stacks *(2 megabytes)*, were subjected to, and passed, the following tests by an independent test house:

> Mechanical shock as per MIL-STD-883 Method 2002.3, Condition B *(1500 G for 0.5ms in the X1, X2, Y1, Y2, Z1, Z2 orientaion).*

> Vibration, variable frequency as per MIL-STD-883 Method 2007.1, Condition A *(20 G peak acceleration in the X, Y, Z orientation).*

DENSE-PAC MICROSYSTEMS, INC.

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Second Generation Stack Technology

1994

Dense-Pac

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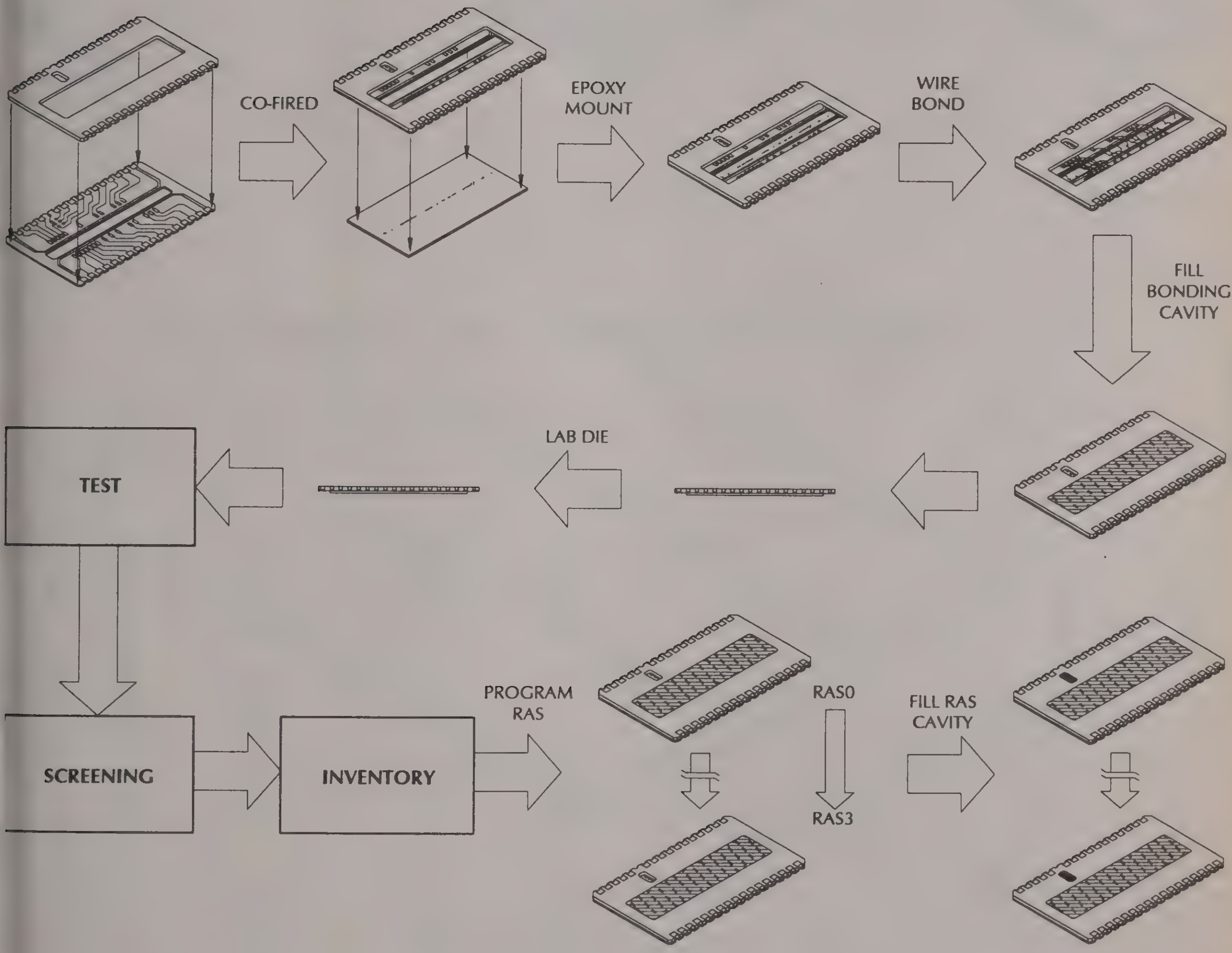
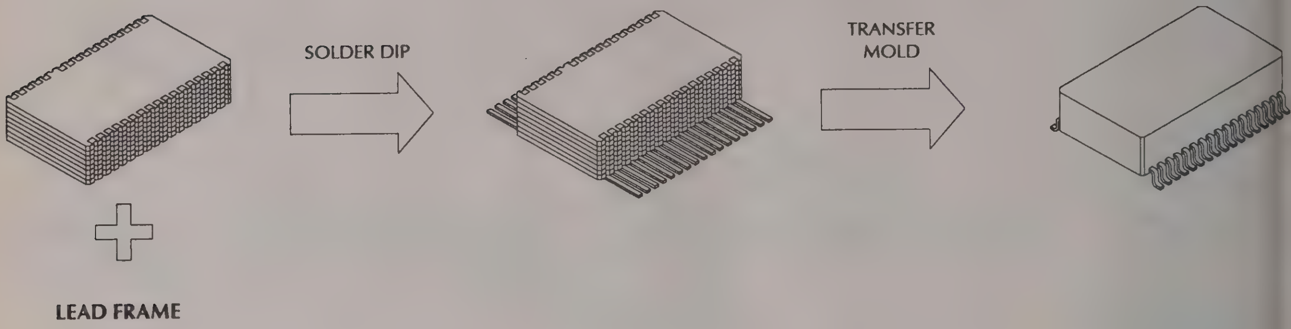
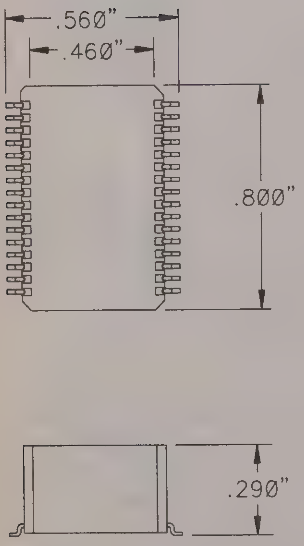
Example Assembly Flow Using 16 Meg DRAM Die


CO-FIRED
EPOXY MOUNT
WIRE BOND
FILL BONDING CAVITY
LAB DIE
TEST
SCREENING
INVENTORY
PROGRAM RAS
RAS0
RAS3
FILL RAS CAVITY

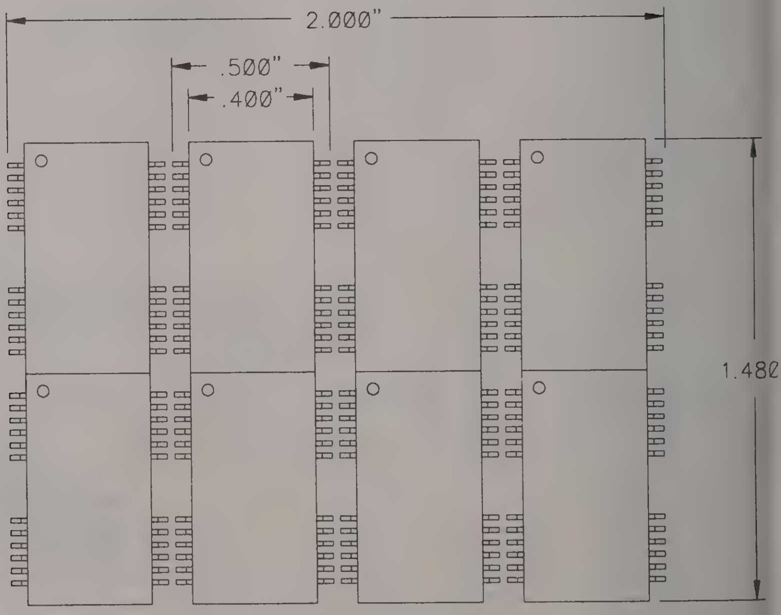
Molded Plastic Stack Assembly and Comparison


SOLDER DIP
TRANSFER MOLD
LEAD FRAME

8-HIGH 16 Meg DRAM STACK vs. 8 TSOP's


.560"
.460"
.800"
.290"

STACK
AREA = .448 in^2
(15%)


2.000"
.500"
.400"
1.48Ø

TSOP's
AREA = 2.96 in^2

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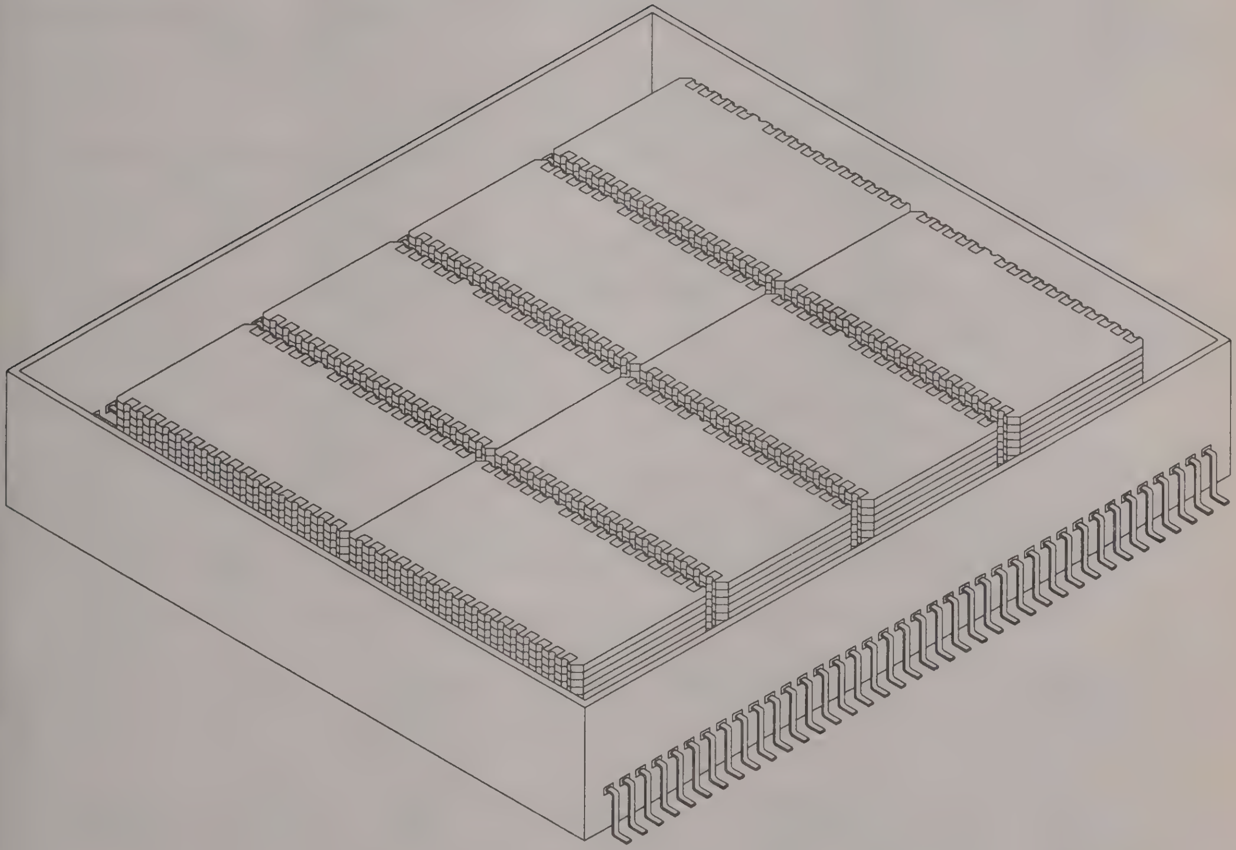
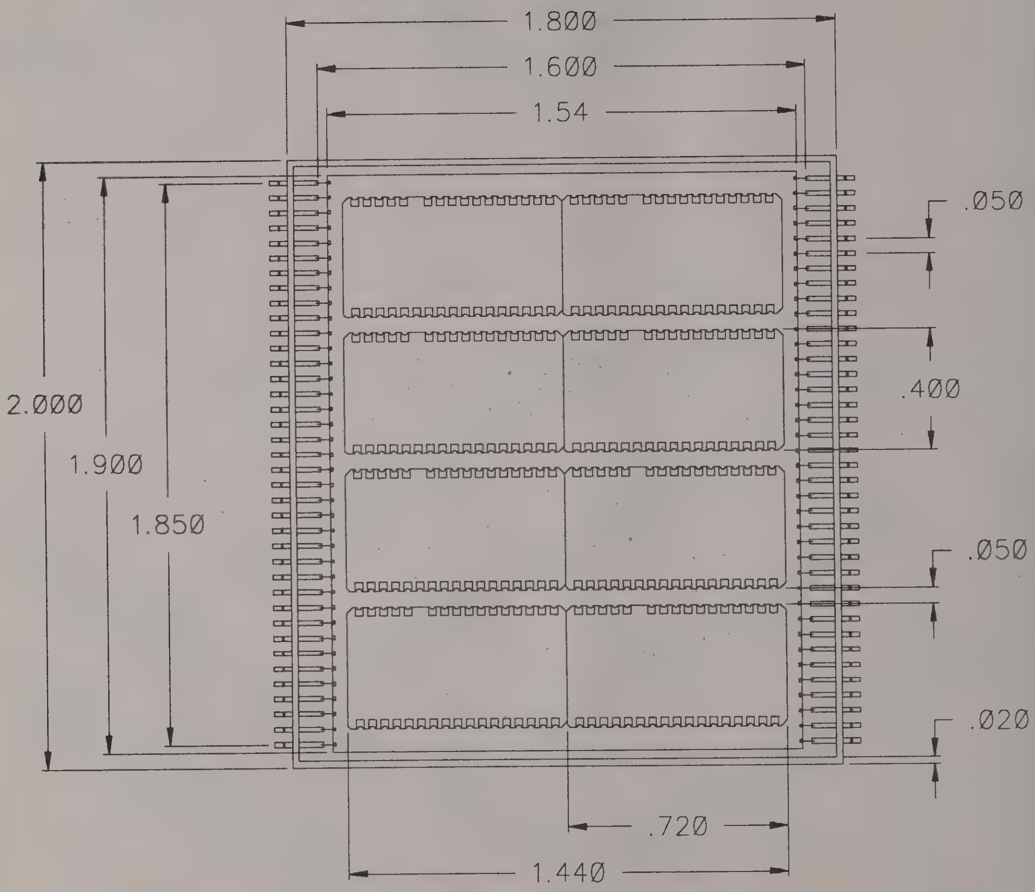
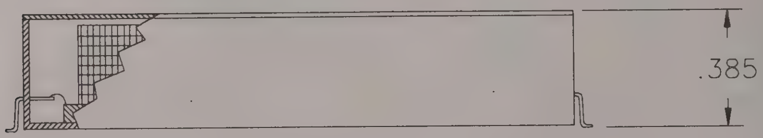
Hermetic Package Option Using 16 Meg Dram Stack Building Block



Hermetic 1 Gigabit Dram Stack Exapmle


1.800
1.600
1.54
.050
.400
.050
.020
2.000
1.900
1.850
.720
1.440



Second Generation Stack Technology Design Features

- ✓ **3-D Density -** Dramatic density improvements are now available at very reasonable costs. A 16 Megabyte plastic molded module occupies less than 0.13 cubic inches. Reduced printed circuit board size, complexity, parasitic impedances and board/system level rework help keep total systems costs down.

- ✓ **Accepts Any Standard Die (Center or End Bonded) -** The unique Stackable Chip Carrier (SCC) substrate can be designed to accept almost any mass production die. The bonding window may be placed down the center for the new center bonded die or windows may be placed on the ends to accept the more traditional end bonded die. Using mass produced silicon helps keep final module cost as low as possible.

- ✓ **Pre-Stacking Testability -** Each die is fully tested and screened before it is committed to the stack. This ability to test the die prior to stacking dramatically improves the final stack yield thereby dramatically reducing the final module cost.

- ✓ **Programmable Package -** The Stackable Chip Carrier (SCC) has a programming window which is used to program the unit for its unique position in the stack. This feature helps keep inventory under control and cost down.

- ✓ **Conventional Packaging Technologies -** Only conventional manufacturing process steps are required to build the second generation stacks. No expensive experimental or unproven manufacturing technology needs to be developed, this helps keep final unit costs under control.

- ✓ **Universal Building Block -** The Stackable Chip Carrier (SCC) is a very flexible building block. The SCC can be stacked from 2 to 8 high with the same silicon at all levels of the stack or different memory technologies can be mixed within the same stack. For example, SRAM, Flash and EEPROM can be combined within the same stack. Two smaller die can be mounted on one SCC while a single larger die is mounted at another layer of the stack. The SCC can be mounted on a substrate which is then hermetically sealed for applications targeted for hostile environments. A fully tested and stacked SCC can be mounted on a Multi-Chip Module (MCM). This gives the user very high MCM substrate densities of known good die.

- ✓ **Reduced Module Costs -** All of the above features of the Second Generation Stack technology work together to provide the designer with the lowest priced 3-D module to meet high density board requirements.

SECOND GENERATION STACKS

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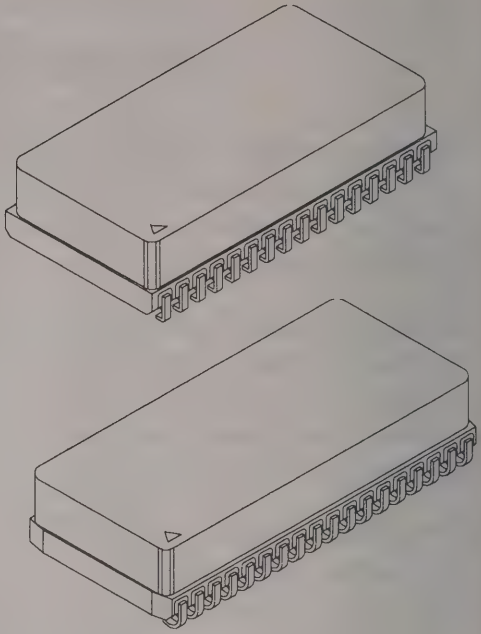
SECOND GENERATION
REVOLUTIONARY AND EVOLUTIONARY
512K x 8 SRAM with Logic



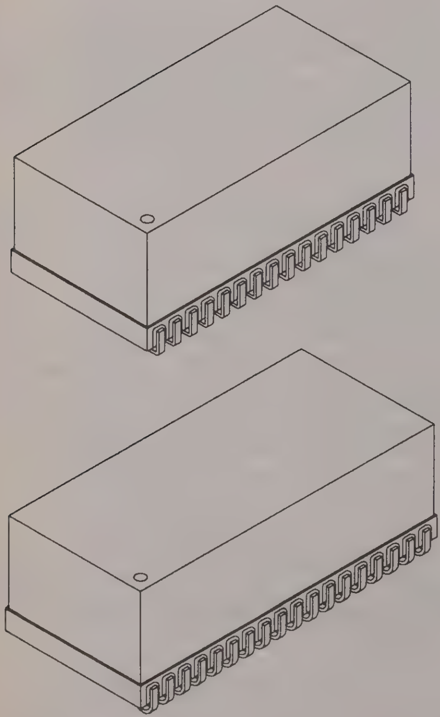
DESCRIPTION:

The DPS512S8EJ4/EH4/RJ4/RL4 surface mount SRAM modules are a revolutionary memory subsystems using Dense-Pac Microsystems' new 2nd Generation Stacking Technology. The module combines four Stackable Chip Carriers (SCC), each containing a 128Kx8 SRAM die, integrated into an encapsulated leaded substrate with decoder logic. The complete module assembly is fully compatible with the JEDEC Standard fast 512Kx8 SRAM monolithics in 32 pin or 36 pin, 400-mil wide surface mount packages.

By using SCCs, the 2nd Generation Stack family of modules offers a higher board density of memory than available with conventional through-hole, surface mount, module, or hybrid techniques.

FEATURES:

- Organization: 524,288 by 8 bit configuration
- Fast Access Times: 20*, 25, 30, 35, 45ns (max.)
- TTL Compatible Inputs and Outputs
- Common I/O with Three State Outputs
- Fully Static Operation - No Clock or Refresh
- Fully Compatible with 512Kx8 SRAM Monolithics
- 400 mil Surface Mount Packages
- Available Packages:
  - Evolutionary 32-Pin:
    - 'J' Leaded Stack (height = .260)
    - 'L' Leaded Stack (height = .245)
  - Revolutionary 36-Pin:
    - 'J' Leaded Stack (height = .225)
    - 'L' Leaded Stack (height = .210)



SECOND GENERATION
REVOLUTIONARY AND EVOLUTIONARY
1 Megabit x 8 SRAM with Logic

DESCRIPTION:

The DPS1MS8EJ4/EH4/RJ4/RL4 surface mount SRAM modules are a revolutionar memory subsystems using Dense-Pac Microsystems' new 2nd Generation Stackin Technology. The module combines eight Stackable Chip Carriers (SCC), each containin a 128Kx8 SRAM die, integrated into an encapsulated leaded substrate with decoder logi The complete module assembly is fully compatible with the JEDEC Standard fast 1Meg x SRAM monolithics in 32 pin or 36 pin, 400-mil wide surface mount packages.

By using SCCs, the 2nd Generation Stack family of modules offers a higher board densit of memory than available with conventional through-hole, surface mount, module, c hybrid techniques.

FEATURES:

- Organization: 1 Meg by 8 bit configuration
- Fast Access Times: 25, 30, 35, 45ns (max.)
- TTL Compatible Inputs and Outputs
- Common I/O with Three State Outputs
- Fully Static Operation - No Clock or Refresh
- Fully Compatible with 512Kx8 SRAM Monolithics
- 400 mil Surface Mount Packages
- Available Packages:
  - Evolutionary 32-Pin:
    - 'J' Leaded Stack (height = .390)
    - 'L' Leaded Stack (height = .375)
  - Revolutionary 36-Pin:
    - 'J' Leaded Stack (height = .355)
    - 'L' Leaded Stack (height = .340)

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SECOND GENERATION STACKS

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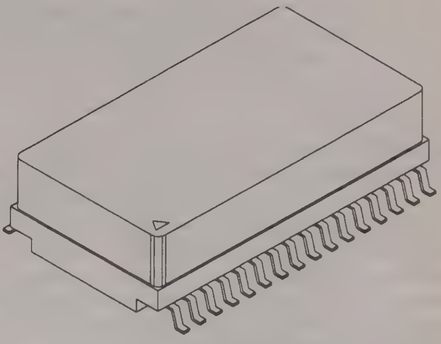
SECOND GENERATION
REVOLUTIONARY AND EVOLUTIONARY
512K x 8 SRAM with Logic



DESCRIPTION:

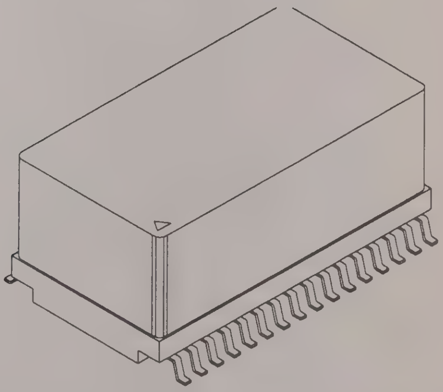
The DPS512S8H4 surface mount CMOS SRAM module is a revolutionary memory subsystem using Dense-Pac Microsystems' new 2nd Generation Stacking Technology. The module combines four Stackable Ceramic Carriers (SCC), each containing a 128Kx8 SRAM die, integrated into a leaded encapsulated substrate with decoder logic. The complete module assembly is fully compatible with the JEDEC Standard 512Kx8 SRAM monolithics in a 32 pin surface mount, gullwing leaded package.

By using SCCs, the 2nd Generation Stack family of modules offers a higher board density of memory than available with conventional through-hole, surface mount, module, or hybrid techniques.

FEATURES:

- 524, 288 by 8 Bit Configuration
- Access Times: 70, 85, 100, 120, 150ns
- Low Power Dissipation:
  375 mW (typ.) Operating
- 2-Volt Data Retention
- Fully Static Operation - No Clock or Refresh Required
- All inputs and Outputs are TTL-Compatible
- Industry Standard,
  32-Pin Gull Leaded Surface Mount Package

SECOND GENERATION
REVOLUTIONARY AND EVOLUTIONARY
512K x 8 SRAM with Logic



DESCRIPTION:

The DPS1MS8H4 surface mount CMOS SRAM module is a revolutionary memory subsystem using Dense-Pac Microsystems' new 2nd Generation Stacking Technology. The module combines eight Stackable Ceramic Carriers (SCC), each containing a 128Kx8 SRAM die, integrated into a leaded encapsulated substrate with decoder logic. The complete module assembly provides a compatible upgrade path for the JEDEC Standard 512Kx8 SRAM monolithics in a 32 pin surface mount, gullwing leaded package.

By using SCCs, the 2nd Generation Stack family of modules offers a higher board density of memory than available with conventional through-hole, surface mount, module, or hybrid techniques.

FEATURES:

- 1 Meg by 8 Bit Configuration
- Access Times: 70, 85, 100, 120, 150ns
- Low Power Dissipation:
  375 mW (typ.) Operating
- 2-Volt Data Retention
- Fully Static Operation - No Clock or Refresh Required
- All inputs and Outputs are TTL-Compatible
  Industry Standard, 32-Pin Gullwing
  Leaded Surface Mount Package

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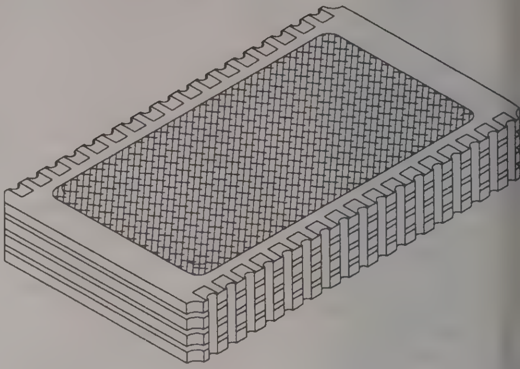
8 Meg x 8 DRAM
Surface Mount Stackable SCC



DESCRIPTION:

The DPD8MX8PY4 DRAM module is a revolutionary memory system using Dense-Pac Microsystems' new 2nd Generation Stacking Technology. The module combines four stackable ceramic carriers (SCC). Each SCC contains a 4M X 4 DRAM die. This module offers 64 Megabits of DRAM in a single ceramic surface mount package.

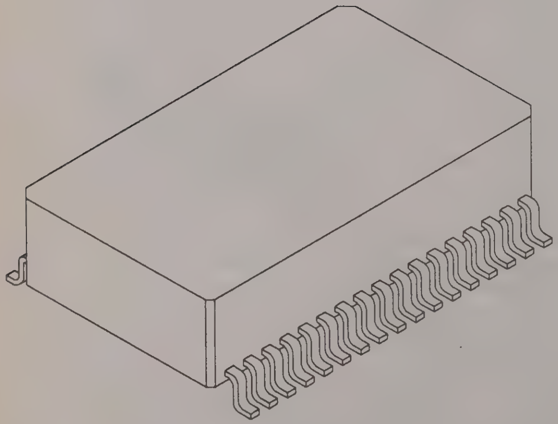
By using SCCs, the 2nd Generation Stack family of modules, offers a higher density of memory than available with conventional through-hole, surface mount, modules, or hybrid techniques.

Modules are assembled using SN96 solder.

FEATURES:

- Organization: 8 Meg x 8 bits
- Fast Read Access Times: 60, 70, 80, 100ns
- TTL Compatible Input and Outputs
- Common Data Inputs and Outputs
- Fast Page
- 4096 Cycles / 64 ms Refresh
- 34-Pin Surface Mount "STACK" Package

16 Meg x 8 or 32 Meg x 4 DRAM
Gullwing Leaded



DESCRIPTION:

The DPD16MX8PH4/DPD32MX4PH4 DRAM module is a revolutionar memory system using Dense-Pac Microsystems' new 2nd Generatio Stacking Technology. The module combines eight stackable ceramic carrier (SCC). Each SCC contains a 4M X 4 DRAM die. This module offers 12 Megabits of DRAM in a single gullwing package.

By using SCCs, the 2nd Generation Stack family of modules, offers a highe density of memory than available with conventional through-hole, surfac mount, modules, or hybrid techniques.

FEATURES:

- Organization:
  - 16 Meg x 8 bit (DPD16MX8PH4)
  - 32 Meg x 4 bit (DPD32MX4PH4)
- Fast Read Access Times: 60, 70, 80, 100, 120ns (max.)
- TTL Compatible Input and Outputs
- Common Data Inputs and Outputs
- 4096 Cycles / 64 ms Refresh
- Fast Page (DPD16MX8PH4)
- Fast Page, Static Column, Write per Bit (DPD32MX4PH4)

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We take pride in our facility and we encourage you to visit us in Santa Clara. If you have any questions regarding the products or services provided by ECI Semiconductor, call one of our technical support engineers at (408) 727-6562 or FAX your requirements to us at (408) 986-9059. Thank you for considering ECI for your custom and semicustom circuits.

PGA Family Components

The transistors in the PGA family are designed to be used for both analog and digital applications. All inputs are protected by clamping diodes to help prevent input signals larger than the power supply from damaging the chip. Capacitors, zener diodes, and resistors up to 5 Megohms are also available. For additional information on the PGA transistors call us.

Products

- Replace 4000 Series
- Oscillators
- Voltage Shifters
- Power Driver
- Digital Circuits
- A/D Converters
- Timers
- Counters
- Level Detectors
- Linear Circuits
- Comparators
- Negative Voltage Generator
- Positive Voltage Generator
- Analog Circuits
- D/A Converters
- Flip Flops
- Schmitt Triggers
- Low Voltage Circuits

Features

- Analog/Digital Circuits
- Working Silicon in 2 to 5 weeks
- Low Power CMOS
- Large Geometry for Improved Reliability
- 1.5 to 25 Volt Power Supply Range
- - 55 to +150 C Operating Temperature
- 5000 Volt ESD Protection
- 5 MHz Frequency at 12 Volts
- Design with one metal layer at the component level for maximum utilization
- 12 to 576 Gates
- Kit Parts and Layout Library
- Design your chip on a PC or let ECI generate the design

Available Components

Chip Type	**P12**	**P36**	**P72**	**P144**	**P288**	**P576**
Chip Size Mils Width x Length	**59 x 63**	**79 x 87**	**87 x 126**	**126 x 138**	**138 x 220**	**224 x 220**
Split Gate N Transistors	24	72	144	288	576	1152
Split Gate P Transistors	24	72	144	288	576	1152
Pads	14	18	24	32	44	60
N Drivers	4	8	8	16	16	32
N Driver Gate Caps	4	8	8	16	16	32
N Buffers	3	5	10	10	22	22
P Buffers	3	5	10	10	22	22
Hi Z Pairs	1	1	2	2	2	2
6.3 Volt Zeners	2	2	2	2	2	2
1.7 Kohm Resistors	18	72	180	360	792	1584
0.8 Kohm Resistors	36	72	72	144	144	288
Cell Underpass						
Inside-620 ohms	12	36	72	144	288	576
Outside-800 ohms	10	33	66	138	276	564

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The 700 Series Linear Bipolar Arrays

The 700 Chip Series

There are eight chips in the 700 Series. The smallest one fits into any surface-mounted package. The remaining seven chips form a smooth progression in size; each chip is approximately 30% larger in area than the next smaller one.

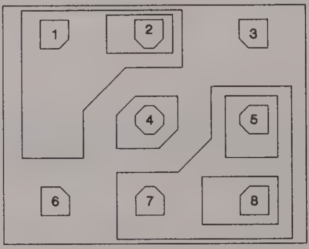
Each chip contains the same basic components and is based on an identical architecture. In the center portion of the chips are islands of 12 transistors each, 10 of which are convertible from NPN to PNP and 2 are Schottky NPN transistors. These islands are surrounded by a field of resistors. The number of resistors and the total resistance is extra large, which makes it easier to design an IC, especially for a first-time design.

Between the pads along the periphery are all other devices: large (200mA) NPN transistors, large (6mA) PNP transistors, pinch (high-value) resistors and junction capacitors. Sprinkled throughout each chip are low-value cross-under resistors.

Chip Series	710	712	713	723	724	734	736	747
Die Size mils	33 x 33	47 x 53	53 x 66	70 x 66	74 x 79	98 x 79	98 x 105	118 x 119
Die Size square mils	1089	2491	3498	4620	5846	7742	10290	14042
Pads	4	17	22	25	30	30	41	48
Dual NPN/PNP Transistors	14	27	39	60	80	120	180	280
Schottky NPN Transistors	4	10	11	12	16	24	36	56
Large NPN Transistors	1	1	2	3	4	9	5	9
Large PNP Transistors	0	1	2	3	3	6	4	5
Total Transistors	33	66	93	143	183	279	405	630
750 Ohm Resistors	120	214	412	635	900	1270	1735	2400
Total Base Resistance	90k	160k	310k	475k	675k	950k	1.3M	1.8M
Base Pinch Resistors	2	9	9	8	11	8	14	16
Epi Pinch Resistors	1	2	2	2	2	2	2	2
Junction Capacitors	1	2	4	7	7	9	12	10
Cross-Unders	40	70	160	200	300	450	650	950

Components

The basic transistor in the 700 Series has three modes of operation, NPN transistor, lateral PNP transistor, and substrate PNP transistor.



Pin Function

1. NPN Base, PNP Collector
2. NPN Emitter
2. NPN Collector, PNP Base
4. PNP Emitter
5. NPN Emitter
6. NPN Collector, PNP Base
7. NPN Base, PNP Collector
8. NPN Emitter

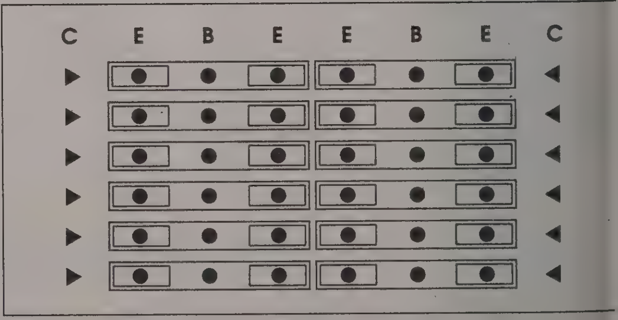
700 Series -A Comparison with GEC Plessey Chips

700 Series	713	MMA	747	MMF
Die Dimensions, mils	53 x 66	56 x 69	118 x 119	109 x 133
Die Area, mils^2	3498	3864	14042	14495
Small Transistors	50	40	336	168
Large NPN Transistors	2(0.2A)	1(0.1A)	9(0.2A)	8(0.1A)
Large PNP Transistors	1	0	5	0
Base Resistance	310k	93k	1.8M	610k
Pads	22	14	48	30
Capacitors	4	1	10	3
20 Volt Pinch Resistors	2	1	2	1
5 Volt Pinch Resistors	9	2	16	16
Schottky Diodes	11	0	56	0
Cross Unders	160	50	950	224

Large NPN Transistors

Large NPN transistors contain 24 emitters identical to those of the small device. The 24 identical emitters provide 200 mA, a substantial amount of current, and are very useful to create current ratios anywhere between 1 and 24.

Current gain = 100 to 300
ft = 400MHz
Current = 8mA per emitter
Maximum current = 200mA



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Transistors in Die Form

Family	Description		Die Size	I.C. Max
M04	General Purpose Low Noise	NPN	13 x 17 MILS	200 mA
M05	Darlington	NPN	18 x 24 MILS	500 mA
M09	General Purpose Audio	NPN	19 x 22 MILS	1 Amp
M10	General Purpose Audio	NPN	19 x 22 MILS	500 mA
M11	General Purpose Audio	NPN	19 x 22 MILS	500 mA
M13	Medium Power Switch	NPN	17 x 20 MILS	500 mA
M16	High Voltage-Gas Display Driver	NPN	24 x 32 MILS	600 mA
M23	General Purpose Switch	NPN	11 x 18 MILS	100 mA
M37	Audio Driver	NPN	25 x 33 MILS	1 Amp
M38	Audio Driver	NPN	25 x 33 MILS	1 Amp
M39	Audio Driver	NPN	25 x 33 MILS	1 Amp
M42	UHF/VHF Amplifier	NPN	10 x 15 MILS	30 mA
M43	RF Amplifier	NPN	10 x 15 MILS	10 mA
M44	Low Noise VHF Amplifier AGC	NPN	10 x 15 MILS	30 mA
M48	Video Output	NPN	24 x 32 MILS	500 mA
M55	Darlington	PNP	18 x 24 MILS	500 mA
M60	General Purpose Audio	PNP	19 x 22 MILS	500 mA
M63	Medium Power Switch	PNP	17 x 20 MILS	500 mA
M66	General Purpose Switch	PNP	11 x 18 MILS	100 mA
M71	General Purpose Low Noise	PNP	13 x 17 MILS	200 mA
M74	High Voltage Amplifier	PNP	24 x 32 MILS	600 mA
M77	Audio Driver	PNP	25 x 33 MILS	1 Amp
M78	Audio Driver	PNP	25 x 33 MILS	1 Amp
M79	Audio Driver	PNP	25 x 33 MILS	1 Amp
M98	High Voltage Amplifier	PNP	24 x 32 MILS	500 mA

JFETs By Process

- Process 50 N-Channel
- Process 51 N-Channel
- Process 52 N-Channel
- Process 53 N-Channel
- Process 55 N-Channel
- Process 58 N-Channel
- Process 83 N-Channel Monolithic Dual
- Process 84 N-Channel Monolithic Dual
- Process 86 N-Channel Monolithic Dual
- Process 87 N-Channel Analog Switch
- Process 88 P-Channel
- Process 89 P-Channel
- Process 90 N-Channel
- Process 92 N-Channel
- Process 93 N-Channel Monolithic Dual
- Process 94 N-Channel Monolithic Dual
- Process 95 N-Channel Monolithic Dual
- Process 96 N-Channel Monolithic Dual
- Process 98 N-Channel Monolithic Dual

RF Transistors in Die Form

Family	Description		Die Size	I.C. Max
41	105 Volt, 600 MHz	NPN	19 x 23 MILS	30 mA
72	105 Volt, 600 MHz	PNP	19 x 23 MILS	30 mA
232	120 Volt, 1.6 GHz	NPN	36 x 23 MILS	70 mA
264	120 Volt, 1.6 GHz	PNP	36 x 23 MILS	70 mA

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Standard Products/
Foundry Services

ECI 1994 Product List

Device	Function	Package	Cross Reference
F10,000	4 Bit Shift Register	16 pin DIP	Fairchild, Teledyne, Motorola
F10,010	BCD Decade Counter	16 pin DIP	Fairchild, Teledyne, Motorola
F10,016	4 Bit Binary Counter	16 pin DIP	Fairchild, Teledyne, Motorola
1004	Voltage Reference	TO-92, SO-8	Linear Tech, TI
2576	Switching Regulator	TO-220, 5 lead	National
2950	Voltage Regulator	TO-92	National
2951	Adjustable V. Regulator	TO-8/SO-8	National
2931	Voltage Regulator	TO-92	National
324	Quad Op-Amp	14 pin DIP	National, TI
339	Quad Comparator	14 pin DIP	National, TI
385	Voltage Regulator	TO-92	National. TI
3854	Power Factor Correction	16 pin DIP	Unitrode
3852	Power Factor Correction	8 pin DIP	Unitrode
3001	Frequency to Voltage Converter	8 pin DIP	ECI Only
431	Voltage Reference	TO-92/SOT23	TI, NSC, Motorola
5010	Voltage Reference	TO-92, SO-8	Si Gen, Teledyne
OP72	OpAmp	TO-92	PMI OP-27
OP77	OpAmp	TO-92	PMI OP-77
78C120	Differential Line Receiver	16 pin DIP	National
78CX120	High Speed Diff Line Driver	16 pin DIP	National
AIT100	Ultra Sound Programmable Gain Amplifier	14 pin CERDIP	ECI Only

Silicon Foundry

ECI Semiconductor was founded in 1974 as Monosil, the original wafer foundry in Silicon Valley. Over the past two decades, we have built a reputation for solid engineering, manufacturing flexibility, and dependable delivery.

Other companies offer foundry services as a side line activity to temporarily fill excess capacity. At ECI Semiconductor, our corporate charter is to produce high quality silicon for customer owned tooling. You can count on ECI to be there over the life of your project.

Give us a call and talk to our engineers. We will work closely with you to find the best manufacturing solution for your circuits. We offer a range of well characterized processes in Bipolar and MOS technologies including:

- 5Volt, 4 Ghz Digital Bipolar
- 12 Volt, 2 GHz Linear/Digital Bipolar
- 20 Volt Linear/ Digital Bipolar
- 40 Volt Linear Bipolar
- 36 Volt Complementary Bipolar
- 15 Volt Analog/Digital Si-Gate CMOS
- 18 Volt Metal Gate CMOS
- 18 Volt Metal Gate PMOS

Our standard recipes can be tailored to accommodate specific circuit requirements for operating voltages, threshold voltages, resistor values, single/dual level metallization, and single/double poly. Special features include nitride capacitors, SiCr thin film resistors, and platinum silicide schottky diodes.

Screening to the most stringent military requirements is available. Packaging and testing services can also be provided.

Check us out if you are starting a new project or if you need a second source. Either way, our pricing is competitive and we put the engineering expertise up front to quickly turn designs into working silicon.

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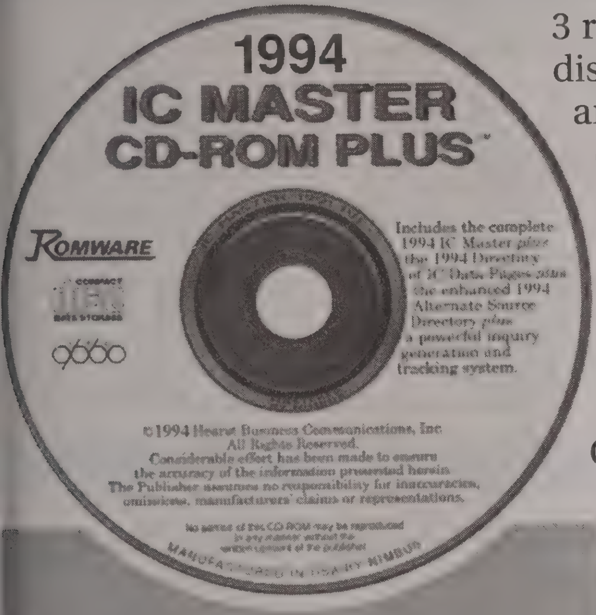
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Product Reference Guide

Subscriber Line Interface Circuits

Part Number	Features	Op. Temp. Range	Package
PBL 3762	Resistive Battery feed SLIC for Moderate Loop Length applications requiring High Longitudinal Balance, On-Hook Transmission, Low power dissipation, and Wide Operating Voltage Range.	0°C / 70°C -40°C / +85°C	22-pin CerDIP 28-pin CLCC 32-pin LCC
PBL 3764	Constant Current Battery feed version.	0°C / 70°C -40°C / +85°C	22-pin CerDIP 28-pin CLCC 32-pin LCC
PBL 3762A	Enhanced Performance PBL3762.	-40°C / +85°C	22-pin CerDIP 28-pin PLCC
PBL 3764A	Enhanced Performance PBL3764.	-40°C / +85°C	22-pin CerDIP 28-pin PLCC
PBL3860	Constant Current feed SLIC for Short Loop Length applications.	-40°C / +85°C	28-pin PLCC
PBL 3766	Low Cost Constant Current Battery feed SLIC for Short Loop Length applications. Includes On-Hook Transmission, Low Power Dissipation, and Wide Operating Voltage Range.	0°C / 70°C	22-pin PDIP 28-pin PLCC
PBL 3767	Low Cost Resistive Battery feed SLIC with Current Limiting for Short Loop Length applications.	0°C / 70°C	28-pin PLCC
PBL 3796	Resistive Battery feed SLIC with Short-Loop Current Limiting for Long Loop Length applications requiring High Longitudinal Balance, On-Hook Transmission, and Minimal Power Dissipation. Includes on-chip Switch Mode Regulator.	0°C / 70°C	28-pin PDIP 32-pin LCC
PBL 3798	Constant Current Battery feed version.	0°C / 70°C	28-pin PDIP 28-pin CerDIP 32-pin PLCC 44-pin PLCC
PBL 3799	Resistive Battery feed version.	0°C / 70°C	28-pin PDIP 28-pin CerDIP 32-pin PLCC 44-pin PLCC
PBL 3797	Constant Current Battery feed SLIC for Long Loop Applications with integral Metering Tone pulse shaping and AGC, High, Longitudinal Balance, and On-Hook Transmission.	0°C / 70°C	44-pin PLCC
PBL 3829	Companion 4-channel DC-DC Converter Controller.	0°C / 70°C	44-pin PLCC

Line Protection Resistors

Part Number	Features	Op. Temp. Range	Package
PBR 5110/1	Matched dual 10 Ohm Resistors	-40°C / +85°C	4-pin SIP
PBR 5111/1	Matched dual 20 Ohm Resistors	-40°C / +85°C	4-pin SIP
PBR 5112/1	Matched dual 40 Ohm Resistors	-40°C / +85°C	4-pin SIP
PBR 5232/3	Matched dual 50 Ohm Resistors with integral thermal fuse	-40°C / +85°C	4-pin SIP

Telephone Circuits

Part Number	Features	Op. Temp. Range	Package
PBL 3726/6	Speech Circuit with volume control amplifier, differential microphone input, low current operation, and gain regulation with line length. Balanced receiver output stage.	-40°C / 70°C	16-pin PDIP 16-pin SOIC
PBL 3726/16	Speech Circuit with volume control amplifier, differential microphone input, low current operation, and gain regulation with line length. Adjustable output drive capability.	-40°C / 70°C	16-pin PDIP 16-pin SOIC

Part Number	Features	Op. Temp. Range	Package
PBL 3726/18	Speech Circuit with internal regulator for external DTMF/microprocessor, separate DTMF and microphone inputs, low current operation, and gain regulation with line length. Balanced receiver output stage.	-40°C / 70°C	16-pin PDIP 16-pin SOIC
PBL 3726/19	Speech Circuit with soft clipping, universal microphone input, low current operation, and gain regulation with line length. Balanced receiver output stage.	-40°C / 70°C	16-pin PDIP 16-pin SOIC
PBL 3781	Speech Circuit with differential microphone input, gain regulation with line length, and Ultra-Low Voltage operation. Drives low impedance receivers.	-20°C / 70°C	16-pin PDIP
PBL 3781/2	Speech Circuit with differential microphone input, gain regulation with line length, and Ultra-Low Voltage operation. Drives high impedance receivers.	-20°C / 70°C	16-pin PDIP 16-pin SOIC
PBL 3786	Line-Powered, Voice-Switched Speakerphone Circuit with integral Tone Ringer, direct loudspeaker driver, and adjustable gain dynamics. Drives low impedance receivers.	- 20°C / 70°C	22-pin PDIP
PBL 3786/2	Line-Powered, Voice-Switched Speakerphone Circuit with integral Tone Ringer, direct loudspeaker driver, and adjustable gain dynamics. Drives high impedance receivers.	- 20°C / 70°C	22-pin PDIP
PBL 3786/4	Line-Powered, Voice-Switched Speakerphone Circuit with integral Tone Ringer, direct loudspeaker driver, and adjustable gain dynamics. DC power amplifier gain control.	- 20°C / 70°C	28-pin PDIP
	Motor Drivers (Stepper /DC)		
PBD 3517	Unipolar Driver with integral controller operating in half-step, full-step, and bilevel drive modes. 500mA maximum output drive current per phase.	0°C / +70°C	16-pin PDIP 16-pin SOIC
PBL 3717/2	Single Channel, Switched-mode Bipolar constant current Driver for bidirectional control of dc or stepper motors. Features half- and full-step modes, thermal overload protection, and built-in recirculation diodes. 1.2A maximum current.	0°C / +70°C	16-pin PDIP 28-pin PLCC
PBL 3770A	Single Channel, Switched-mode Bipolar constant current Driver for bidirectional control of dc or stepper motors. Features half- and full-step modes, and thermal overload protection. 1.8A maximum current.	0°C / +70°C	16-pin PDIP 28-pin PLCC
PBL 3771	Dual Channel, Switched-mode Bipolar constant current Driver featuring close matching between channels for high microstepping accuracy. 700mA maximum current per Channel.	0°C / +70°C	22-pin PDIP 28-pin PLCC
PBL 3772	Dual Channel, Switched-mode Bipolar constant current Driver featuring close matching between channels for high microstepping accuracy. 1.2A maximum current per Channel.	-40°C / +85°C	22-pin PDIP 28-pin PLCC
PBL 3773	Dual Channel, Switched-mode Bipolar constant current Driver. Low external component count, high impedance current control inputs and disable input for simplified half-stepping control. 850mA maximum current per Channel.	-20°C / +85°C	22-pin PDIP 28-pin PLCC
PBL 3774	Dual Channel, Switched-mode Bipolar constant current Driver. Disable input for simplified half-stepping control and close matching between channels for high microstepping accuracy. 1.2A maximum current per Channel.	-40°C / +85°C	22-pin PDIP 28-pin PLCC
PBL 3775	Dual Channel, Switched-mode Bipolar constant current Driver. Low external component count and disable input for simplified half-stepping control. 850mA maximum current per Channel.	-20°C / +85°C	22-pin PDIP 28-pin PLCC
PBL 3776	Dual Channel, Switched-mode Bipolar constant current controller IC for driving external transistors in High Current applications. Capable of controlling any MosFET or Bipolar power transistor. Disable input for simplified half-stepping control.	-40°C / +85°C	24-pin PDIP
PBL 3960	Dual Channel Microstepping Controller featuring fast/slow current decay control matched to our Dual Channel Drivers.	0°C / +70°C	22-pin PDIP 28-pin PLCC
	Intelligent Power Drivers		
PBD 3545/1	Low side Driver with Short Circuit and Thermal Protection and integral ERROR output for diagnostic action. Open Circuit detection. 2A continuous output current at 45V maximum.	-40°C / +85°C	5-pin TO-220
PBD 3548/1	High side Driver with Short Circuit and Thermal Protection and integral ERROR output for diagnostic action. Open Circuit detection. 2A continuous output current at 45V maximum.	-40°C / +85°C	5-pin TO-220

June 1991
Edition 4.0

FUJITSU

DATA SHEET

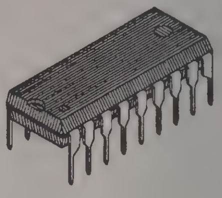
MB81C1000A-60/-70/-80/-10
CMOS 1M x 1 BIT FAST PAGE MODE DYNAMIC RAM

The Fujitsu MB81C1000A is a CMOS, fully decoded dynamic RAM organized as 1,048,576 words x 1 bit. The MB81C1000A has been designed for mainframe memories, buffer memories, video image memories requiring high speed and high-band width output with low power dissipation, as well as for memory systems of hand-held computers which need very low power dissipation.

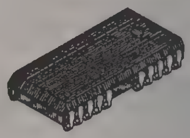
Fujitsu's advanced three-dimensional stacked capacitor cell technology gives the MB81C1000A high α-ray soft error immunity and extended refresh time. CMOS technology is used in the peripheral circuits to provide low power dissipation and high speed operation.

Parameter		MB81C1000A -60	MB81C1000A -70	MB81C1000A -80	MB81C1000A -10
$\overline{\text{RAS}}$ Access Time		60 ns max	70 ns max.	80 ns max.	100 ns
Random Cycle Time		110 ns min.	125 ns min.	140 ns min.	170 ns min.
Address Access Time		30 ns max.	35 ns max.	40 ns max.	50 ns max.
$\overline{\text{CAS}}$ Access Time		15 ns max.	20 ns max.	20 ns max.	25 ns max.
Fast Page Mode Cycle Time		40 ns min.	45 ns min.	45 ns min.	55 ns min.
Low Power Dissipation	Operating Current	407 mW max.	374 mW max.	341 mW max.	297 mW max.
	Standby Current	11 mW max. (TTL level) / 5.5 mW max. (CMOS level)			

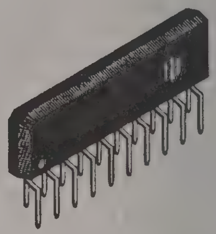
- 1,048,576 words x 1 bit organization
- Silicon gate, CMOS, 3-D stacked capacitor cell
- All inputs and outputs are TTL compatible
- 512 refresh cycles every 8.2 ms
- Common I/O capability by using early write
- $\overline{\text{RAS}}$ only, $\overline{\text{CAS}}$-before-$\overline{\text{RAS}}$, or hidden refresh
- Fast page mode, Read-Modify-Write capability
- On-chip substrate bias generator for high performance



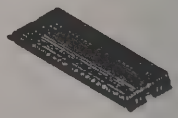
DIP-18P-M04



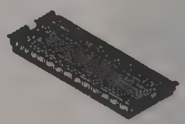
LCC-26P-M04



ZIP-20P-M02



*** FPT-24P-M04**



*** FPT-24P-M05**

*** Available for 70/80/100 ns versions**

This device contains circuitry to protect the inputs against damage due to high static voltages or electric fields. However, it is advised that normal precautions be taken to avoid application of any voltage higher than maximum rated voltages to this high impedance circuit.

Absolute Maximum Ratings

Parameter	Symbol	Ratings	Unit
Voltage at any pin relative to V_{SS}	V_{IN}, V_{OUT}	-1 to +7	V
Voltage of V_{CC} supply relative to V_{SS}	V_{CC}	-1 to +7	V
Power dissipation	PD	1.0	W
Short circuit output current	—	50	mA
Storage temperature	T_{STG}	-55 to +125	°C

Note: Permanent device damage may occur if absolute maximum ratings are exceeded. Functional operation should be restricted to the conditions as detailed in the operational sections of this data sheet. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

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June 1991
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DATA SHEET

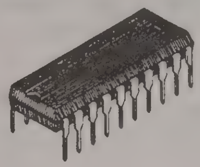
MB81C4256A-60/-70/-80/-10
CMOS 256K x 4 BIT FAST PAGE MODE DYNAMIC RAM

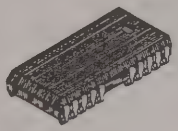
The Fujitsu MB81C4256A is a CMOS, fully decoded dynamic RAM organized as 262,144 words x 4 bits. The MB81C4256A has been designed for mainframe memories, buffer memories, video image memories requiring high speed and high-band width output with low power dissipation, as well as for memory systems of handheld computers which need very low power dissipation.

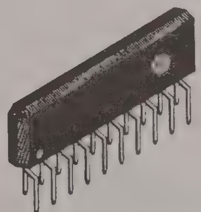
Fujitsu's advanced three-dimensional stacked capacitor cell technology gives the MB81C4256A high α-ray soft error immunity and extended refresh time. CMOS technology is used in the peripheral circuits to provide low power dissipation and high speed operation..

Parameter		MB81C4256A -60	MB81C4256A -70	MB81C4256A -80	MB81C4256A -10
$\overline{\text{RAS}}$ Access Time		60 ns max	70 ns max.	80 ns max.	100 ns
Random Cycle Time		110 ns min.	125 ns min.	140 ns min.	170 ns min.
Address Access Time		30 ns max.	35 ns max.	40 ns max.	50 ns max.
$\overline{\text{CAS}}$ Access Time		15 ns max.	20 ns max.	20 ns max.	25 ns max.
Fast Page Mode Cycle Time		40 ns min.	45 ns min.	45 ns min.	55 ns min.
Low Power Dissipation	Operating Current	407 mW max.	374 mW max.	341 mW max.	297 mW max.
	Standby Current	11 mW max. (TTL level) / 5.5 mW max. (CMOS level)			

- 262,144 words x 4 bits organization
- Silicon gate, CMOS, 3-D stacked capacitor cell
- All inputs and outputs are TTL compatible
- 512 refresh cycles every 8.2 ms
- Early write or $\overline{\text{OE}}$ controlled write capability
- $\overline{\text{RAS}}$ only, $\overline{\text{CAS}}$-before-$\overline{\text{RAS}}$, or Hidden Refresh
- Fast page mode, Read-Modify-Write capability
- On-chip substrate bias generator for high performance


DIP-20P-M03


LCC-26P-M04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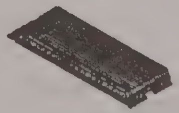
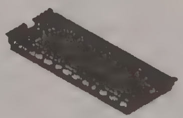

* FPT-24P-M04


* FPT-24P-M05

* Available for 70/80/100 ns versions

Absolute Maximum Ratings

Parameter	Symbol	Ratings	Unit
Voltage at any pin relative to V_{SS}	V_{IN}, V_{OUT}	-1 to +7	V
Voltage of V_{CC} supply relative to V_{SS}	V_{CC}	-1 to +7	V
Power dissipation	PD	1.0	W
Short circuit output current	—	50	mA
Storage temperature	T_{STG}	-55 to +125	°C

Note: Permanent device damage may occur if absolute maximum ratings are exceeded. Functional operation should be restricted to the conditions as detailed in the operational sections of this data sheet. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

This device contains circuitry to protect the inputs against damage due to high static voltages or electric fields. However, it is advised that normal precautions be taken to avoid application of any voltage higher than maximum rated voltages to this high impedance circuit.

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March 1992
Edition 1.0

FUJITSU

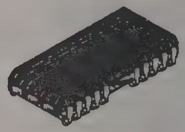
DATA SHEET

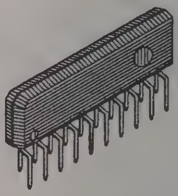
MB814100A-60/-70/-80
CMOS 4M x 1 BIT FAST PAGE MODE DRAM

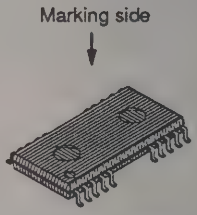
CMOS 4,194,304 x 1 BIT FAST PAGE MODE DYNAMIC RAM

The Fujitsu MB814100A is a fully decoded CMOS Dynamic RAM (DRAM) that contains a total of 4,194,804 memory cells in a x1 configuration. The MB814100A features a "fast page" mode of operation whereby high-speed random access of up to 2,048-bits of data within the same row can be selected. The MB814100A DRAM is ideally suited for main-frame, buffers, hand-held computers video imaging equipment, and other memory applications where very low power dissipation and high bandwidth are basic requirements of the design. Since the standby current of the MB814100A is very small, the device can be used as a non-volatile memory in equipment that uses batteries for primary and/or auxiliary power.

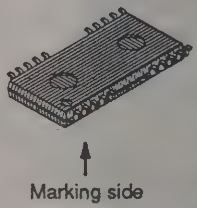
The MB814100A is fabricated using silicon gate CMOS and Fujitsu's advanced four-layer polysilicon process. This process, coupled with three-dimensional stacked capacitor memory cells, reduces the possibility of soft errors and extends the time interval between memory refreshes. Clock timing requirements for the MB814100A are not critical and all inputs are TTL compatible.


LCC-26P-M04


ZIP-20P-M02



(Normal Bend)
FPT-26P-M01



(Reserve Bend)
FPT-26P-M02

PRODUCT LINE & FEATURES

Parameter		MB814100A-60	MB814100A-70	MB814100A-80
$\overline{\text{RAS}}$ Access Time		60ns max.	70ns max.	80ns max.
$\overline{\text{CAS}}$ Access Time		15ns max.	20ns max.	20ns max.
Address Access Time		30ns max.	35ns max.	40ns max.
Random Cycle Time		110ns min.	125ns min.	140ns min.
Fastpage Mode Cycle Time		40ns min.	45ns min.	45ns min.
Low Power Dissipation	Operating current	605mW max.	550mW max.	495mW max.
	Standby current	11mW max. (TTL level) 5.5mW max. (CMOS level)		

- 4,194,304 word x 1 bit organization
- Silicon gate, CMOS, 3D-Stacked Capacitor Cell
- All input and output are TTL compatible
- On chip substrate bias generator for high performance
- Common I/O capability by using early write
- $\overline{\text{RAS}}$ only, $\overline{\text{CAS}}$-before-$\overline{\text{RAS}}$, or Hidden Refresh
- Fast Mode, Read-Modify-Write capability
- 1024 refresh cycles every 16.4ms

ABSOLUTE MAXIMUM RATINGS (see Note)

Parameter	Symbol	Value	Unit
Voltage at any pin relative to VSS	V_{IN}, V_{OUT}	–1 to +7	V
Voltage of V_{CC} supply relative to VSS	V_{CC}	–1 to +7	V
Power Dissipation	PD	1.0	W
Short Circuit Output Current		50	mA
Storage Temperature	TSTG	–55 to +125	°C

Note: Permanent device damage may occur if the above Absolute Maximum Ratings are exceeded. Functional operation should be restricted to the conditions as detailed in the operational sections of this data sheet. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

This device contains circuitry to protect the inputs against damage due to high static voltages or electric fields. However, it is advised that normal precautions be taken to avoid application of any voltage higher than maximum rated voltages to this high impedance circuit.

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March 1992
Edition 1.0

FUJITSU

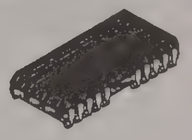
DATA SHEET

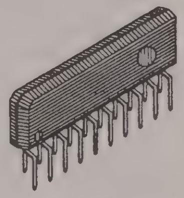
MB814400A-60/-70/-80
CMOS 1M x 4 BIT FAST PAGE MODE DRAM

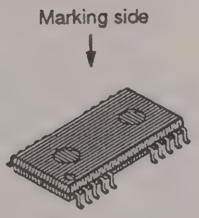
CMOS 1,048,576 x 4 BIT FAST PAGE MODE DYNAMIC RAM

The Fujitsu MB814400A is a fully decoded CMOS Dynamic RAM (DRAM) that contains a total of 1,048,576 memory cells in 4-bit increments. The MB814400A features a “fast page” mode of operation whereby high-speed random access of up to 1,024-bits of data within the same row can be selected. The MB814400A DRAM is ideally suited for mainframe, buffers, hand-held computers video imaging equipment, and other memory applications where very low power dissipation and high bandwidth are basic requirements of the design. Since the standby current of the MB814400A is very small, the device can be used as a non-volatile memory in equipment that uses batteries for primary and/or auxiliary power.

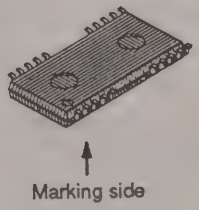
The MB814400A is fabricated using silicon gate CMOS and Fujitsu’s advanced four-layer polysilicon process. This process, coupled with three-dimensional stacked capacitor memory cells, reduces the possibility of soft errors and extends the time interval between memory refreshes. Clock timing requirements for the MB814400A are not critical and all inputs are TTL compatible.


LCC-26P-M04


ZIP-20P-M02



(Normal Bend)
FPT-26P-M01



(Reserve Bend)
FPT-26P-M02

PRODUCT LINE & FEATURES

Parameter		MB814400A-60	MB814400A-70	MB814400A-80
$\overline{\text{RAS}}$ Access Time		60ns max.	70ns max.	80ns max.
$\overline{\text{CAS}}$ Access Time		15ns max.	20ns max.	20ns max.
Address Access Time		30ns max.	35ns max.	40ns max.
Random Cycle Time		110ns min.	125ns min.	140ns min.
Fastpage Mode Cycle Time		40ns min.	45ns min.	45ns min.
Low Power Dissipation	Operating current	605mW max.	550mW max.	495mW max.
	Standby current	11mW max. (TTL level) 5.5mW max. (CMOS level)		

- 1,048,576 word x 4 bit organization
- Silicon gate, CMOS, 3D-Stacked Capacitor Cell
- All input and output are TTL compatible
- On chip substrate bias generator for high performance
- Early write or $\overline{\text{OE}}$ controlled write capability
- $\overline{\text{RAS}}$ only, $\overline{\text{CAS}}$-before-$\overline{\text{RAS}}$, or Hidden Refresh
- Fast Mode, Read-Modify-Write capability
- 1024 refresh cycles every 16.4ms

ABSOLUTE MAXIMUM RATINGS (see Note)

Parameter	Symbol	Value	Unit
Voltage at any pin relative to VSS	V_{IN}, V_{OUT}	–1 to +7	V
Voltage of V_{CC} supply relative to VSS	V_{CC}	–1 to +7	V
Power Dissipation	PD	1.0	W
Short Circuit Output Current		50	mA
Storage Temperature	TSTG	–55 to +125	°C

Note: Permanent device damage may occur if the above Absolute Maximum Ratings are exceeded. Functional operation should be restricted to the conditions as detailed in the operational sections of this data sheet. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

This device contains circuitry to protect the inputs against damage due to high static voltages or electric fields. However, it is advised that normal precautions be taken to avoid application of any voltage higher than maximum rated voltages to this high impedance circuit.

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August 1992
Edition 2.0A

FUJITSU

DATA SHEET

MB814260A-70/-80/-10

CMOS 256K x 16 Bits Fast Page Mode Dynamic RAM

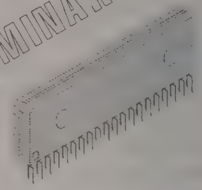
The Fujitsu MB814260A is a fully decoded CMOS Dynamic RAM (DRAM) that contains 4,194,304 memory cells accessible in 16- or 8-bit increments. The MB814260A features a fast page mode of operation whereby high-speed access of up to 512 x 16 bits of data can be selected in the same row. The MB814260A DRAM is ideally suited for memory applications where very low power dissipation and high bandwidth are basic requirements of the design such as embedded control buffers, portable computers, and video imaging equipment.

The MB814260A is fabricated using silicon gate CMOS and Fujitsu's advanced four-layer polysilicon process. This process, coupled with three-dimensional stacked capacitor memory cells, reduces the possibility of soft errors and extends the time interval between memory refreshes.

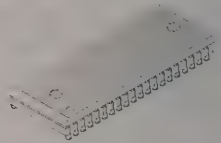
Parameter		MB814260A-70	MB814260A-80	MB814260A-10
$\overline{\text{RAS}}$ Access Time		70 ns max.	80 ns max.	100 ns max.
$\overline{\text{CAS}}$ Access Time		20 ns max.	20 ns max.	25 ns max.
Address Access Time		35 ns max.	40 ns max.	45 ns max.
Random Cycle Time		125 ns min.	140 ns min.	170 ns min.
Fast Page Mode Cycle Time		45 ns min.	50 ns min.	55 ns min.
Low Power Dissipation	Operating Current	853 mW max.	770 mW max.	633 mW max.
	Standby Current	11 mW max. (TTL level)/5.5 mW max. (CMOS level)		

- 262,144 words x 16 bits organization
- Silicon gate, CMOS, 3D-stacked capacitor cell
- All inputs and outputs are TTL compatible
- 512 refresh cycles every 8.2 ms
- 9 rows x 9 columns address scheme
- 1 $\overline{\text{WE}}$/2 $\overline{\text{CAS}}$
- Early write or $\overline{\text{OE}}$ controlled write capability
- $\overline{\text{RAS}}$ only, $\overline{\text{CAS}}$-before-$\overline{\text{RAS}}$, or hidden refresh
- Fast page mode, Read-Modify-Write capability
- On-chip substrate bias generator for high performance

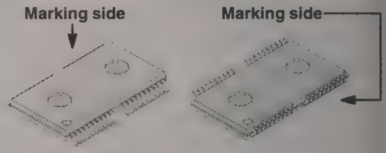
PRELIMINARY



Plastic ZIP
(ZIP-40P-M01)



Plastic SOJ
(LCC-40P-M01)



Plastic TSOP-II

(normal bend leads)
(FPT-44P-M07)

(reverse bend leads)
(FPT-44P-M08)

Package and Ordering Information

- 40-pin plastic (475 mil) ZIP, order as MB814260A-xxPZ
- 40-pin plastic (400 mil) SOJ, order as MB814260A-xxPJ
- 44-pin plastic (400 mil) TSOP-II with normal bend leads, order as MB814260A-xxPFTN
- 44-pin plastic (400 mil) TSOP-II with reverse bend leads, order as MB814260A-xxPFTR

This device contains circuitry to protect the inputs against damage due to high static voltages or electric fields. However, it is advised that normal precautions be taken to avoid application of any voltage higher than maximum rated voltages to this high impedance circuit.

Absolute Maximum Ratings

Parameter	Symbol	Ratings	Unit
Voltage at any pin relative to V_{SS}	V_{IN}, V_{OUT}	–1 to +7	V
Voltage of V_{CC} supply relative to V_{SS}	V_{CC}	–1 to +7	V
Power dissipation	PD	1.0	W
Short circuit output current	—	50	mA
Storage temperature	T_{STG}	–55 to +125	°C

— Note —

Permanent device damage may occur if absolute maximum ratings are exceeded. Functional operation should be restricted to the conditions as detailed in the operational sections of this data sheet. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

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September 1992
Edition 3.0

FUJITSU

DATA SHEET

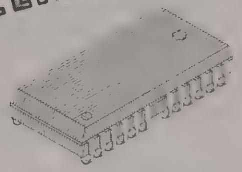
MB8116100-60/-70/-80
CMOS 16M x 1 BIT FAST PAGE MODE DYNAMIC RAM

CMOS 16,777,216 x 1 Bit Fast Page Mode Dynamic RAM

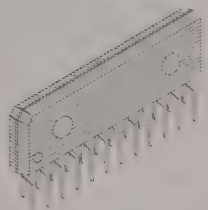
The Fujitsu MB8116100 is a fully decoded CMOS Dynamic RAM (DRAM) that contains a total of 16,777,216 memory cells in a x1 configuration. The MB8116100 features a "fast page" mode of operation whereby high–speed random access of up to 4,096–bits of data within the same row can be selected. The MB8116100 DRAM is ideally suited for mainframe, buffers, hand–held computers video imaging equipment, and other memory applications where very low power dissipation and high bandwidth are basic requirements of the design. Since the standby current of the MB8116100 s very small, the device can be used as a non–volatile memory in equipment that uses batteries for primary and/or auxiliary power.

The MB8116100 is fabricated using silicon gate CMOS and Fujitsu's advanced four–layer polysilicon and two layer aluminum process. This process, coupled with advanced stacked capacitor memory cells, reduces the possibility of soft errors and extends the time interval between memory refreshes. Clock timing requirements for the MB8116100 are not critical and all inputs are TTL compatible.

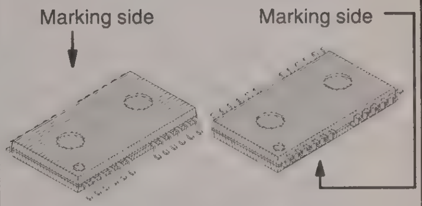
PRELIMINARY



Plastic SOJ Package
(LCC–28P–M06)



Plastic ZIP Package
(ZIP–24P–M03)



Plastic TSOP Packages
(FPT–28P–M05) **(FPT–28P–M06)**
(Normal Bend) (Reverse Bend)

PRODUCT LINE & FEATURES

Parameter	MB8116100–60	MB8116100–70	MB8116100–80
$\overline{\text{RAS}}$ Access Time	60ns max.	70ns max.	80ns max.
Randam Cycle Time	110ns min.	130ns min.	150ns min.
Address Access Time	30ns max.	35ns max.	40ns max.
$\overline{\text{CAS}}$ Access Time	15ns max.	17ns max.	20ns max.
Fast Page Mode Cycle Time	40ns min.	45ns min.	50ns min.
Low Power Dissipation • Operating current	550mW max.	495mW max.	440mW max.
• Standby current	11mW max. (TTL level) / 5.5mW max. (CMOS level)		

- 16,777,216 words x 1 bit organization
- Silicon gate, CMOS, Advanced Stacked Capacitor Cell
- All input and output are TTL compatible
- 4096 refresh cycles every 65.6ms
- Common I/O capability by using early write
- $\overline{\text{RAS}}$ only, $\overline{\text{CAS}}$–before–$\overline{\text{RAS}}$, or Hidden Refresh
- Fast page Mode, Read–Modify–Write capability
- On chip substrate bias generator for high performance

ABSOLUTE MAXIMUM RATINGS (see NOTE)

Parameter	Symbol	Value	Unit
Voltage at any pin relative to VSS	V_{IN}, V_{OUT}	–1 to +7	V
Voltage of V_{CC} supply relative to VSS	V_{CC}	–1 to +7	V
Power Dissipation	PD	1.0	W
Short Circuit Output Current	—	50	mA
Operating Temperature	T_{OPE}	0 to 70	°C
Storage Temperature	T_{STG}	–55 to +125	°C

NOTE: Permanent device damage may occur if the above **Absolute Maximum Ratings** are exceeded. Functional operation should be restricted to the conditions as detailed in the operational sections of this data sheet. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

Package and Ordering Information

- 28–pin plastic (400mil) SOJ, order as MB8116100–xxPJ
- 24–pin plastic (475mil) ZIP, order as MB8116100–xxPZ
- 28–pin plastic (400mil) TSOP–II with normal bend leads, order as MB8116100–xxPFTN
- 28–pin plastic (400mil) TSOP–II with reverse bend leads, order as MB8116100–xxPFTR

This device contains circuitry to protect the inputs against damage due to high static voltages or electric fields. However, it is advised that normal precautions be taken to avoid application of any voltage higher than maximum rated voltages to this high impedance circuit.

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FUJITSU

DATA SHEET

MB8116400-60/-70/-80

CMOS 4M x 4 BIT FAST PAGE MODE DYNAMIC RAM

PRELIMINARY

CMOS 4,194,304 x 4 BIT Fast Page Mode Dynamic RAM

The Fujitsu MB8116400 is a fully decoded CMOS Dynamic RAM (DRAM) that contains 16,777,216 memory cells accessible in 4–bit increments. The MB8116400 features a "fast page" mode of operation whereby high–speed random access of up to 1,024–bits of data within the same row can be selected. The MB8116400 DRAM is ideally suited for mainframe, buffers, hand–held computers video imaging equipment, and other memory applications where very low power dissipation and high bandwidth are basic requirements of the design. Since the standby current of the MB8116400 is very small, the device can be used as a non–volatile memory in equipment that uses batteries for primary and/or auxiliary power.

The MB8116400 is fabricated using silicon gate CMOS and Fujitsu's advanced four–layer polysilicon and two–layer aluminum process. This process, coupled with advanced stacked capacitor memory cells, reduces the possibility of soft errors and extends the time interval between memory refreshes. Clock timing requirements for the MB8116400 are not critical and all inputs are TTL compatible.

PRODUCT LINE & FEATURES

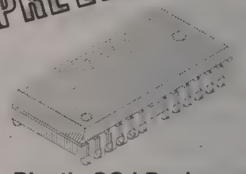
Parameter	MB8116400–60	MB8116400–70	MB8116400–80
$\overline{\text{RAS}}$ Access Time	60ns max.	70ns max.	80ns max.
Randam Cycle Time	110ns min.	130ns min.	150ns min.
Address Access Time	30ns max.	35ns max.	40ns max.
$\overline{\text{CAS}}$ Access Time	15ns max.	17ns max.	20ns max.
Fast Page Mode Cycle Time	40ns min.	45ns min.	50ns min.
Low Power Dissipation • Operating current	550mW max.	495mW max.	440mW max.
• Standby current	11mW max. (TTL level) / 5.5mW max. (CMOS level)		

- 4,194,304 words x 4 bit organization
- Silicon gate, CMOS, Advanced Capacitor Cell
- All input and output are TTL compatible
- 4096 refresh cycles every 65.6ms
- Early write or $\overline{\text{OE}}$ controlled write capability
- $\overline{\text{RAS}}$ only, $\overline{\text{CAS}}$–before–$\overline{\text{RAS}}$, or Hidden Refresh
- Fast page Mode, Read–Modify–Write capability
- On chip substrate bias generator for high performance

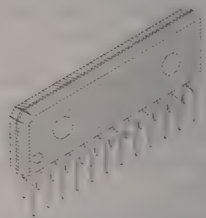
ABSOLUTE MAXIMUM RATINGS (see NOTE)

Parameter	Symbol	Value	Unit
Voltage at any pin relative to VSS	V_{IN}, V_{OUT}	–1 to +7	V
Voltage of V_{CC} supply relative to VSS	V_{CC}	–1 to +7	V
Power Dissipation	PD	1.0	W
Short Circuit Output Current	—	50	mA
Operating Temperature	T_{OPE}	0 to 70	°C
Storage Temperature	T_{STG}	–55 to +125	°C

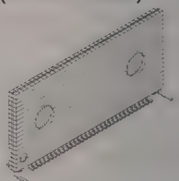
NOTE: Permanent device damage may occur if the above **Absolute Maximum Ratings** are exceeded. Functional operation should be restricted to the conditions as detailed in the operational sections of this data sheet. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.



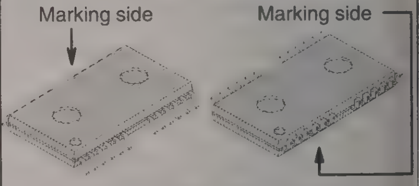
Plastic SOJ Package
(LCC–28P–M06)



Plastic ZIP Package
(ZIP–24P–M03)



Plastic VSMP Package
(VSMP–32P–M02)



Plastic TSOP Packages
(FPT–28P–M05) (Normal Bend) **(FPT–28P–M06)** (Reverse Bend)

Package and Ordering Information

- 28–pin plastic (400mil) SOJ, order as MB8116400–xxPJ
- 24–pin plastic (475mil) ZIP, order as MB8116400–xxPZ
- 32–pin plastic (13 x 25mm) VSMP, order as MB8116400–xxPV
- 28–pin plastic (400mil) TSOP–II with normal bend leads, order as MB8116400–xxPFTN
- 28–pin plastic (400mil) TSOP–II with reverse bend leads, order as MB8116400–xxPFTR

This device contains circuitry to protect the inputs against damage due to high static voltages or electric fields. However, it is advised that normal precautions be taken to avoid application of any voltage higher than maximum rated voltages to this high impedance circuit.

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Edition 1.0

FUJITSU

DATA SHEET

MB8117400-60/-70/-80

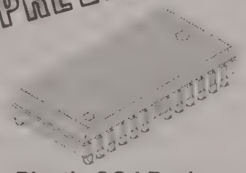
CMOS 4M x 4 BIT FAST PAGE MODE DYNAMIC RAM

PRELIMINARY

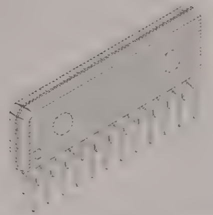
CMOS 4,194,304 x 4 BIT Fast Page Mode Dynamic RAM

The Fujitsu MB8117400 is a fully decoded CMOS Dynamic RAM (DRAM) that contains 16,777,216 memory cells accessible in 4–bit increments. The MB8117400 features a "fast page" mode of operation whereby high–speed random access of up to 8,196–bits of data within the same row can be selected. The MB8117400 DRAM is ideally suited for mainframe, buffers, hand–held computers video imaging equipment, and other memory applications where very low power dissipation and high bandwidth are basic requirements of the design. Since the standby current of the MB8117400 is very small, the device can be used as a non–volatile memory in equipment that uses batteries for primary and/or auxiliary power.

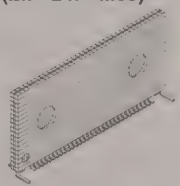
The MB8117400 is fabricated using silicon gate CMOS and Fujitsu's advanced four–layer polysilicon and two–layer aluminum process. This process, coupled with advanced stacked capacitor memory cells, reduces the possibility of soft errors and extends the time interval between memory refreshes. Clock timing requirements for the MB8117400 are not critical and all inputs are TTL compatible.



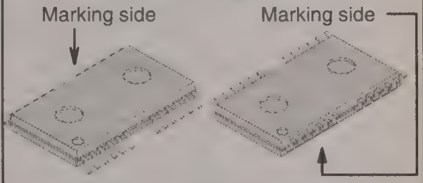
Plastic SOJ Package
(LCC–28P–M06)



Plastic ZIP Package
(ZIP–24P–M03)



Plastic VSMP Package
(VSMP–32P–M02)



Plastic TSOP Packages
(FPT–28P–M05) (FPT–28P–M06)
(Normal Bend) (Reverse Bend)

PRODUCT LINE & FEATURES

Parameter	MB8117400–60	MB8117400–70	MB8117400–80
$\overline{\text{RAS}}$ Access Time	60ns max.	70ns max.	80ns max.
Randam Cycle Time	110ns min.	130ns min.	150ns min.
Address Access Time	30ns max.	35ns max.	40ns max.
$\overline{\text{CAS}}$ Access Time	15ns max.	17ns max.	20ns max.
Fast Page Mode Cycle Time	40ns min.	45ns min.	50ns min.
Low Power Dissipation • Operating current	660mW max.	550mW max.	468mW max.
• Standby current	11mW max. (TTL level) / 5.5mW max. (CMOS level)		

- 4,194,304 words x 4 bit organization
- Silicon gate, CMOS, Advanced Capacitor Cell
- All input and output are TTL compatible
- 2048 refresh cycles every 32ms
- Early write or $\overline{\text{OE}}$ controlled write capability
- $\overline{\text{RAS}}$ only, $\overline{\text{CAS}}$–before–$\overline{\text{RAS}}$, or Hidden Refresh
- Fast page Mode, Read–Modify–Write capability
- On chip substrate bias generator for high performance

ABSOLUTE MAXIMUM RATINGS (see NOTE)

Parameter	Symbol	Value	Unit
Voltage at any pin relative to VSS	V_{IN}, V_{OUT}	–1 to +7	V
Voltage of V_{CC} supply relative to VSS	V_{CC}	–1 to +7	V
Power Dissipation	PD	1.0	W
Short Circuit Output Current	—	50	mA
Operating Temperature	T_{OPE}	0 to 70	°C
Storage Temperature	T_{STG}	–55 to +125	°C

NOTE: Permanent device damage may occur if the above **Absolute Maximum Ratings** are exceeded. Functional operation should be restricted to the conditions as detailed in the operational sections of this data sheet. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

Package and Ordering Information

- 28–pin plastic (400mil) SOJ, order as MB8117400–xxPJ
- 24–pin plastic (475mil) ZIP, order as MB8117400–xxPZ
- 32–pin plastic (13 x 25mm) VSMP, order as MB8117400–xxPV
- 28–pin plastic (400mil) TSOP–II with normal bend leads, order as MB8117400–xxPFTN
- 28–pin plastic (400mil) TSOP–II with reverse bend leads, order as MB8117400–xxPFTR

This device contains circuitry to protect the inputs against damage due to high static voltages or electric fields. However, it is advised that normal precautions be taken to avoid application of any voltage higher than maximum rated voltages to this high impedance circuit.

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FUJITSU

DATA SHEET

MB85336-60/-70/-80/-10

CMOS 256K x 36 Fast Page Mode DRAM Module

The Fujitsu MB85336 is a fully decoded, CMOS dynamic random access memory (DRAM) module consisting of eight MB81C4256A devices and four MB81C256A devices. The MB85336 is optimized for applications requiring high speed, high performance, and large memory storage. The operation and electrical characteristics of the MB85336 are the same as the MB81C4256A, which features fast page mode operation. For ease of memory expansion, the MB85336 is offered in a 72-pad Single In-Line Memory Module (SIMM) package.

- Organization: 262,144 words x 36 bits

Module	Maximum Access Time			Standby Power
	$\overline{\text{RAS}}$	$\overline{\text{CAS}}$	Column Address	
MB85336-60	6o ns	15 ns	30 ns	4884 mW
MB85336-70	70 ns	20 ns	35 ns	4488 mW
MB85336-80	80 ns	20 ns	40 ns	4092 mW
MB85336-10	100 ns	25 ns	50 ns	3564 mW

- Standby power: 66 mW maximum (CMOS level)
  132 mW maximum (TTL level)
- Fast page mode
- Single +5V supply, ± 10% tolerance
- TTL compatible I/O
- Decouplng capacitor: 0.22 μF, 12 pcs
- JEDEC standard package outline:
  72-pad SIMM MB85336-XXPS
  72-pad SIMM MB85336-XXPSG (gold pad)

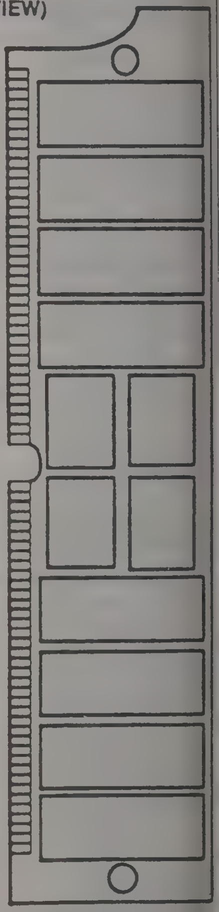
Presence Detect Table

Pin No.	Pin Name	-60	-70	-80	-10
67	PD1	NC	NC	NC	NC
68	PD2	V_{SS}	V_{SS}	V_{SS}	V_{SS}
69	PD3	NC	V_{SS}	NC	V_{SS}
70	PD4	NC	NC	V_{SS}	V_{SS}

MSS-72P-P12

PAD ASSIGNMENT
(TOP VIEW)

		1	VSS
DQ0	2	3	DQ18
DQ1	4	5	DQ19
DQ2	6	7	DQ20
DQ3	8	9	DQ21
VCC	10	11	NC
A0	12	13	A1
A2	14	15	A3
A4	16	17	A5
A6	18	19	NC
DQ4	20	21	DQ22
DQ5	22	23	DQ23
DQ6	24	25	DQ24
DQ7	26	27	DQ25
A7	28	29	NC
VCC	30	31	A8
NC	32	33	NC
/RAS2	34	35	DQ26
DQ8	36		
DQ35	38	37	DQ17
/CAS0	40	39	VSS
/CAS3	42	41	/CAS2
/RAS0	44	43	/CAS1
NC	46	45	NC
NC	48	47	/WE
DQ27	50	49	DQ9
DQ28	52	51	DQ10
DQ29	54	53	DQ11
DQ30	56	55	DQ12
DQ31	58	57	DQ13
DQ32	60	59	VCC
DQ33	62	61	DQ14
DQ34	64	63	DQ15
NC	66	65	DQ16
PD2	68	67	PD1
PD4	70	69	PD3
VSS	72	71	NC



ABSOLUTE MAXIMUM RATINGS (see Note)

Rating	Symbol	Value	Unit
Supply voltage	V_{CC}	–1.0 to +7.0	V
Input voltage	V_{IN}	–1.0 to +7.0	V
Output voltage	V_{OUT}	–1.0 to +7.0	V
Short circuit output current	I_{OUT}	± 50	mA
Clamp circuit input voltage	P_D	12.0	W
Storage temperature	T_{STG}	–55 to +125	°C

Note : Permanent device damage may occur if the above Absolute Maximum Ratings are exceeded. Functional operation should be restricted to the conditions as detailed in the operational sections data sheet. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

This device contains circuitry to protect the inputs against damage due to high static voltages or electric fields. However, it is advised that normal precautions be taken to avoid application of any voltage higher than maximum rated voltages to this high impedance circuit.

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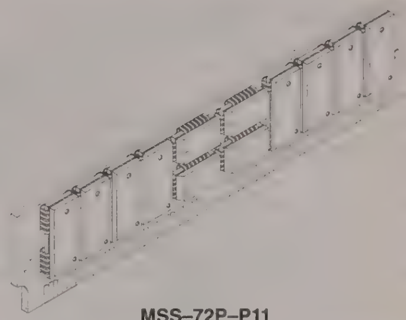
Edition 2.3

FUJITSU

DATA SHEET

MB85346-80/-10
CMOS 1M x 36 Fast Page Mode DRAM Module

The Fujitsu MB85346 is a fully decoded, CMOS dynamic random access memory (DRAM) module consisting of eight MB814400 devices and four MB81C1000A devices. The MB85346 is optimized for those applications requiring high speed, high performance and large memory storage. The operation and electrical characteristics of the MB85346 are the same as the MB814400 which features fast page mode operation. For ease of memory expansion, the MB85346 is offered in a 72-pad Single In-Line Memory Module Package (SIM).


MSS–72P–P11
MSS–72P–P23

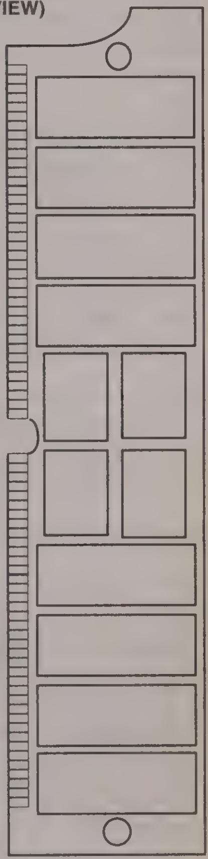
- Organization:
  1.048,576 words x 36 bits
- $\overline{\text{RAS}}$ Access Time:
  80 ns max. (MB85346-80)
  100 ns max (MB85346-10)
- $\overline{\text{CAS}}$ Access Time:
  20 ns max. (MB85346-80)
  25 ns max. (MB85346-10)
- Column Address Access Time:
  40 ns max. (MB85346-80)
  50 ns max. (MB85346-10)
- Active Power:
  4664 mW max. (MB85346-80)
  4048 mW max. (MB85346-10)
- Standby Power:
  66 mW max. (CMOS Level)
  132 mW max. (TTL Level)
- Fast Page Mode
- Single +5 V Supply ±10% Tolerance
- TTL Compatible I/O
- Decoupling Capacitor:
  0.22 µF, 12 pcs
- Package and Ordering Information:
  72-pad SIM, order as
  MB85346-xxPS
  (PS = Solder Pad) or
  MB85346-xxPSG
  (PSG = Gold Pad)

PRESENCE DETECT TABLE

Pin No.	Pin Name	–80	–10
67	PD1	V_{SS}	V_{SS}
68	PD2	V_{SS}	V_{SS}
69	PD3	NC	V_{SS}
70	PD4	V_{SS}	V_{SS}

PAD ASSIGNMENT
(TOP VIEW)

DQ0	2	1	VSS
DQ1	4	3	DQ18
DQ2	6	5	DQ19
DQ3	8	7	DQ20
VCC	10	9	DQ21
A0	12	11	NC
A2	14	13	A1
A4	16	15	A3
A6	18	17	A5
DQ4	20	19	NC
DQ5	22	21	DQ22
DQ6	24	23	DQ23
DQ7	26	25	DQ24
A7	28	27	DQ25
VCC	30	29	NC
A9	32	31	A8
/RAS2	34	33	NC
DQ8	36	35	DQ26
DQ35	38	37	DQ17
/CAS0	40	39	VSS
/CAS3	42	41	/CAS2
/RAS0	44	43	/CAS1
NC	46	45	NC
NC	48	47	/WE
DQ27	50	49	DQ9
DQ28	52	51	DQ10
DQ29	54	53	DQ11
DQ30	56	55	DQ12
DQ31	58	57	DQ13
DQ32	60	59	VCC
DQ33	62	61	DQ14
DQ34	64	63	DQ15
NC	66	65	DQ16
PD2	68	67	PD1
PD4	70	69	PD3
VSS	72	71	NC



ABSOLUTE MAXIMUM RATINGS (See note)

Rating	Symbol	Value	Rating
Supply Voltage	V_{CC}	–1.0 to +7.0	V
Input Voltage	V_{IN}	–1.0 to +7.0	V
Output Voltage	V_{OUT}	–1.0 to +7.0	V
Short Circuit Output Current	I_{OUT}	±50	mA
Power Dissipation	P_D	12.0	W
Storage Temperature	T_{STG}	–55 to +125	°C

Note: Permanent device damage may occur if absolute maximum ratings are exceeded. Functional operation should be restricted to the conditions as detailed in the operation sections of this data sheet. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

This device contains circuitry to protect the inputs against damage due to high static voltages or electric fields. However, it is advised that normal precautions be taken to avoid application of any voltage higher than maximum rated voltage to this high impedance circuit.

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Edition 1.0

FUJITSU

PRODUCT INFORMATION

MB87033B Series

SCSI Protocol Controller (SPC) With On-Chip Drivers/Receivers

GENERAL DESCRIPTION

The MB87033 SCSI Protocol Controller (SPC) is a CMOS LSI circuit specifically designed to control a Small Computer Systems Interface (SCSI). The MB87033 rounds out Fujitsu's SPC family of protocol controllers by providing software enhancements and other functional features that will meet all facits of the SCSI specification (ANSI X 3.131-1986).

To achieve optimum performance and interface flexibility, the MB87033 provides an 8-byte First-In First-Out (FIFO) data buffer register and a 28-bit transfer byte counter which allows burst transfers of up to 256 megabytes. To improve programming requirements, "Attention Detect" and "Arbitration Fail" interrupts are provided and on-chip driver/receiver circuits simplify interface connections. Data transfers can be executed in either the asynchronous or synchronous mode with a maximum offset of 8-bytes.

SCSI Compatibility

- Supports all mandatory commands, many optional commands, and some extended commands of SCSI Specification (ANSI X3.131, 1986)
- Software compatible with MB87030/31
- Serves as either INITIATOR or TARGET

Data Buses

- Independent buses for CPU and DMA controller

Transfer Modes

- Asynchronous
- Synchronous mode transfers with programmable offset of up to eight bytes (8-byte FIFO)

Data Transfer Speed

- Up to a maximum of 5-megabyte/sec

Selectable Operating Modes

- DMA transfers
- Program transfers
- Manual Transfers
- Diagnostic

Interface

- On-chip single ended Drivers/Receivers
- Guaranteed to sink 48mA regardless of the number of outputs simultaneously asserted

Enhancements

- On-chip parity generation
- Attention condition detect interrupt
- Arbitration fail interrupt

Clock Requirements

- 10MHz clock

Technology/Power Requirements

- Silicon-gate CMOS
- Single +5V power supply

Available Packaging

- 84-pin plastic leadless chip carrier
- 80-pin plastic flat package

ABSOLUTE MAXIMUM RATINGS[1]

Rating	Symbol	Values		Unit
		Min	Max	
Supply Voltage	V_{DD}	$V_{SS}{}^2$ –0.3	6.0	V
Input Voltage	V_I	$V_{SS}{}^2$ –0.3	V_{DD} + 0.3	V
Output Voltage[2]	V_O	$V_{SS}{}^2$ –0.3	V_{DD} + 0.3	V
Storage Temperature (Ceramic)	T_{STG}	–65	+125	°C

NOTES:

1. Permanent device damage may occur if the above Absolute Maximum Ratings are exceeded. Functional operation should be restricted to the conditions as detailed in the operational sections of this data sheet. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.
2. $V_{SS} = 0$ V
3. Not more than one output may be shorted at a time for a maximum duration of one second.

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February 1991
Edition 2.0

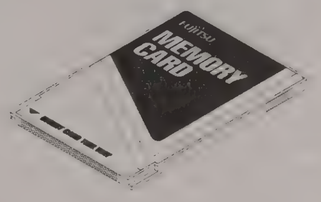
FUJITSU

DATA SHEET

MB98A8081-20/8091-20/8101-20/8111-20
Flash Card Memory

FLASH ERASABLE PROGRAMMABLE MEMORY CARD 256K/512K/1M/2M-BYTE

PRELIMINARY



CRD-68P-M05

The Fujitsu MB98A8081, MB98A8091, MB98A8101 and MB98A8111 are flash memory cards capable of storing and retrieving large amounts of data. Each flash memory card contains multiple 1M-bit flash memory devices.

The flash memory card circuits are housed in a credit-card sized 68-pin package. Internal circuitry is protected by metal plates on the top and bottom of the card to help reduce chip damage from electrostatic discharge.

A unique feature of the Fujitsu memory cards allows the user to organize the card into either an 8-bit or a 16-bit organization. All cards are portable and operate at high speed with low power needs.

- Card dimensions: 85.6 length x 54.0 width x 3.3 thickness (mm)
- Connector type: Two-piece 68-pin (built-in 68-pin receptacle, 2-row type)
- Command control for Write/Erase operation
- Write protect function
- +5.0 V ± 5% power supply (12.0 V ± 5% V_{PP})

AVAILABLE ORGANIZATIONS

Part Number	Mounted Memory Devices	Access Time	Memory Organization[1]
MB98A8081-20	1M-bit flash memory x 2 pcs	200 ns	256 K x 8 bits/128 K x 16 bits
MB98A8091-20	1M-bit flash memory x 4 pcs	200 ns	512 K x 8 bits/256 K x 16 bits
MB98A8101-20	1M-bit flash memory x 8 pcs	200 ns	1M x 8 bits/512 K x 16 bits
MB98A8111-20	1M-bit flash memory x 16 pcs	200 ns	2M x 8 bits/1M x 16 bits

Note: [1] To be configured by user.

ABSOLUTE MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Supply Voltage	V_{CC}	–0.5 to +6.0	V
Input Voltage	V_{IN}	–0.5 to +6.0	V
Output Voltage	$V_{I/O}$	–0.5 to +6.0	V
Programming Voltage[1, 2]	V_{PP1}, V_{PP2}	–2.0 to 14.0	V
Temperature under Bias	T_{BIAS}	–10 to +70	°C
Operating Temperature	T_A	0 to +60	°C
Storage Temperature	T_{STG}	-30 to +70	°C

Notes: Permanent device damage may occur if absolute maximum ratings are exceeded. Functional operation should be restricted to the conditions as detailed in the operation sections of this data sheet. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

[1] Minimum DC input voltage is -0.5 V. During transitions, inputs may undershoot to –2.00 V for periods less than 20 ns.
[2] Maximum DC input voltage on V_{PP} may overshoot to +14.0 V for periods less than 20 ns.

This device contains circuitry to protect the inputs against damage due to high static voltages or electric fields. However, it is advised that normal precautions be taken to avoid application of any voltage higher than maximum rated voltages to this high impedance circuit.

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May 1992
Edition 1.1

FUJITSU

DATA SHEET

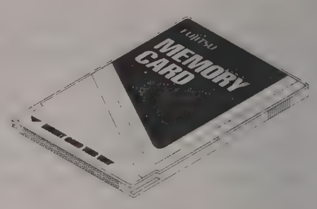
MB98A8092x- / 8102x- / 8112x- / 8122x-25 FLASH MEMORY CARD

FLASH ERASEABLE AND PROGRAMMABLE MEMORY CARD
512K / 1M / 2M / 4M -BYTE

The Fujitsu MB98A8092x, MB98A8102x, MB98A8112x and MB98A8122x are Flash electrically eraseable and programmable (Flash) memory cards capable of storing and retrieving large amounts of data. The memory circuits are housed in a credit-card sized 68-pin package. Internal circuit is protected by two metal panels, one at the top and bottom of the card, that help to reduce chip damage from electrostatic discharge.

A unique feature of the Fujitsu memory cards allows the user to organize the card into either an 8-bit or a 16-bit bus configuration. All cards are portable and operate on low power at high speed.

In accordance with the Personal Computer Memory Card Internal Association (PCMCIA) and Japan Electrical Industry Development Association (JEIDA) industry standard specification, Flash memory cards offer additional EEPROM memory that is used to store attribute data. The attribute memory is an Flash memory card option. (See page 2 for description of the three available options.)



CRD–68P–M05

- PCMCIA and JEIDA industry standard for 68-pin memory card
- Credit card size dimensions: 85.6mm (length) x 54.0mm (width) x 3.3mm (thick)
- PCMCIA / JEIDA industry standard, two-piece 68-pin connector (with a two-row built-in receptacle)
- Single +5V±5% power supply (+12.0V±5%VPP)
- Command control for Write / Erase operation
- Write protect function

ABSOLUTE MAXIMUM RATINGS (see NOTE)

Rating	Symbol	Value	Unit
Supply Voltage	VCC	–0.5 to +6.0	V
Input Voltage	VIN	–0.5 to +6.0	V
Output Voltage	VOUT	–0.5 to +6.0	V
Programming Voltage *1	VPP1, VPP2	–2.0 to +14.0	V
Temperature under Bias	TBIAS	–10 to +70	°C
Storage Temperature	TSTG	–30 to +70	°C

Note: *1 Minimum DC input voltage is –0.5V.

NOTE: Permanent device damage may occur if the above **Absolute Maximum Ratings** are exceeded. Functional operation should be restricted to the conditions as detailed in the operational sections of this data sheet. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

This device contains circuitry to protect the inputs against damage due to high static voltages or electric fields. However, it is advised that normal precautions be taken to avoid application of any voltage higher than maximum rated voltages to this high impedance circuit.

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Edition 3.0A

FUJITSU

DATA SHEET

MB98A9061x, MB9071x, MB9081x, and 9091x-20
Low Power SRAM Memory Card
64K, 128K, 256K, and 512k-Byte

The Fujitsu MB98A9061x, MB98A9071x, MB98A9081x and MB98A9091x are Static Random Access Memory (SRAM) cards capable of storing and retrieving large amounts of data. The memory circuits are housed in a credit-card sized 68-pin package. Internal circuitry is protected by two metal panels, one at the top and the bottom of the card, to educe chip damage from electrostatic discharge.

When the SRAM card is not powered by its system, an on-board, replaceable lithium battery (coin-type) is used to retain data. When the lithium battery must be replaced, two echargeable batteries that are built into the SRAM card, maintain data. (See the BLOCK DIAGRAM for location of batteries.)

A unique feature of the Fujitsu memory cards allows the user to organize the card into either an 8-bit or a 16-bit bus configuration. This new series (MB98A9061x-20 etc.) of SRAM cards consume less power than the MB98A9060x-20 series, thus extending system battery life and performance.

n accordance with the Personal Computer Memory Card International Association PCMCIA) and Japan Electrical Industry Development Association (JEIDA) industry standard specification, SRAM cards offer additional EEPROM memory for storing attribute data. The attribute memory is an SRAM memory card option. (See page 2 for a description of the three available options.)

FUJITSU
MEMORY
CARD

68-pin Memory Card
(CRD-68P-M04)

- PCMCIA and JEIDA industry standard for 68-pin memory card
- Credit card size: 85.6 mm (length) x 54.0 mm (width) x 3.3 mm (thick).
- PCMCIA/JEIDA industry standard, two-piece 68-pin connector (with a two-row built-in 68-pin receptacle)
- Low operating and standby power consumption
- Replaceable lithium battery
- Built-in, rechargeable batteries for data retention during lithium battery replacement
- Battery voltage detect and write protect function

ABSOLUTE MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Supply Voltage	V_{CC}	–0.5 to +6.0	V
Input Voltage	V_{IN}	–0.5 to V_{CC} +0.5	V
Output Voltage	V_{OUT}	–0.5 to V_{CC} +0.5	V
Temperature Under Bias	T_{BIAS}	–10 to +60[1]	°C
Storage Temperature	T_{STG}	–20 to +65[2]	°C

Notes: [1] This value does not apply to the replaceable battery.
[2] This value does not apply to the replaceable battery and data retention.

This device contains circuitry to protect the inputs against damage due to high static voltages or electric fields. However, it is advised that normal precautions be taken to avoid application of any voltage higher than maximum rated voltages to this high impedance circuit

— Note —

Permanent device damage may occur if absolute maximum ratings are exceeded. Functional operation should be restricted to the conditions as detailed in the operational sections of this data sheet. Exposure to absolute maximum rating conditions for extended periods may affect device eliability.

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Edition 1.0

FUJITSU

DATA SHEET

MB98A9102x-20/9112x-20

LOW POWER SRAM MEMORY CARD

LOW POWER STATIC RANDOM ACCESS MEMORY CARD
1M/ 2M-BYTE

PRELIMINARY

FUJITSU
MEMORY
CARD

CRD—6BP-M04

The Fujitsu MB98A9102x and MB98A9112x are Static Random Access Memory (SRAM) cards capable of storing and retrieving large amounts of data. The memory circuits are housed in a credit-card sized 68-pin package. Internal circuitry is protected by two metal panels, one at the top and one at the bottom of the card, that help to reduce chip damage from electrostatic discharge.

When the SRAM card is not powered by its system, an on-board, replaceable lithium battery (coin-type) is used to retain data. When the lithium battery must be replaced, two rechargeable batteries that are built into the SRAM card, maintain data. (See the BLOCK DIAGRAM for location of batteries.)

A unique feature of the Fujitsu memory cards allows the user to organize the card into either an 8-bit or a 16-bit bus configuration. All cards are portable and operate on low power at high speed.

In accordance with the Personal Computer Memory Card Internal Association (PCMCIA) and Japan Electrical Industry Development Association (JEIDA) industry standard specification, SRAM cards offer additional EEPROM memory that is used to store attribute data. The attribute memory is an SRAM memory card option. (See page 2 for a description of the three available options.)

- PCMCIA and JEIDA industry standard for 68-pin memory card
- Credit card size: 85.6mm (length) x 54.0mm (width) x 3.3mm (thick).
- PCMCIA/JEIDA industry standard, two-piece 68-pin connector (with a two-row built-in 68-pin replaceable)
- Low operating and standby power consumption
- Replaceable lithium battery
- Built-in, rechargeable batteries for data retention during lithium battery replacement
- Battery voltage detect and write protect function

ABSOLUTE MAXIMUM RATINGS (see Note)

Rating	Symbol	Value	Unit
Supply Voltage	V_{CC}	–0.5 to + 6.0	V
Input Voltage	V_{IN}	–0.5 to VCC + 0.5	V
Output Voltage	V_{OUT}	–0.5 to VCC + 0.5	V
Temperature under Bias	T_{BIAS}	–10 to + 60 [1]	°C
Storage Temperature	T_{STG}	–20 to + 65 [2]	°C

Notes: 1. This value does not apply to the replaceable battery.
2. This value does not apply to the replaceable battery and data retention.

Note: Permanent device damage may occur if the above Absolute **Maximum Ratings** are exceeded. Functional operation should be restricted to the conditions as detailed in the operational sections of this data sheet. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

This device contains circuitry to protect the inputs against damage due to high static voltages or electric fields. However, it is advised that normal precautions be taken to avoid application of any voltage higher than maximum rated voltages to this high impedance circuit.

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March 1993
Edition 1.1

FUJITSU

DATA SHEET

MB1510

DUAL SERIAL INPUT PLL FREQUENCY SYNTHESIZER

DUAL SERIAL INPUT PLL FREQUENCY SYNTHESIZER WITH GHz PRESCALER

DESCRIPTION

The Fujitsu MB1510 is a 1.1 GHz dual serial input PLL (Phase Locked Loop) frequency synthesizer designed for cellular telephone and cordless telephone applications.

The MB1510 has two PLL circuits on a single chip: PLL1 and PLL2. An analog switch is provided for each PLL circuit decrease lock up time. Separate power supply pins are provided for each PLL circuit as well.

1.1 GHz dual modulus prescalers are on chip and enables a pulse swallow function.

It operates from a supply voltage of 3.0V typ. and dissipates 15 mA typ. of current realized through the use of Fujitsu's unique U-ESBIC Bi—CMOS technology.

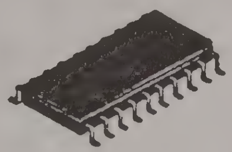
FEATURES

- High operating frequency: f_{in} = 1.1 GHz (V_{in} = -10 dBm, V_{CC} = 3V)
- Pulse swallow function: 64/65 or 128/129
- Low power supply current: I_{CC} = 15 mA typ, @3V.
- Serial input reference divider: R = 512 or 1024
- Serial input 18-bit programmable divider consisting of:
  - — Binary 7-bit swallow counter: 0 to 127
  - — Binary 11-bit programmable counter: 16 to 2047
  - — Tx and Rx programmable counters may be controlled separately.
- Low power supply voltage: V_{CC} = 2.7 to 5.5V
- On-chip analog switches achieve fast lockup time
- Fast lock up by bipolar charge pumps
- Wide operating temperature: T_A = -40 to 85°C
- Plastic 20-pin flat package (Suffix: -PF)

ABSOLUTE MAXIMUM RATINGS (see NOTE)

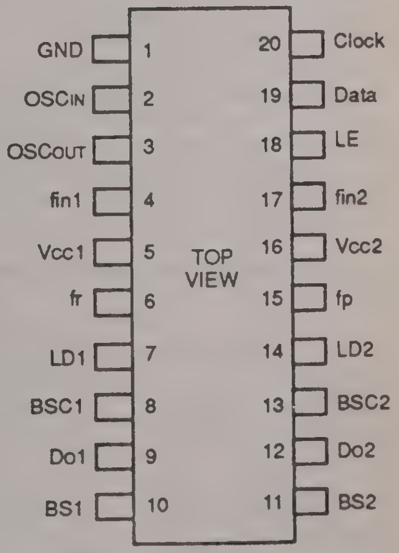
Rating	Symbol	Value	Unit
Power Supply Voltage	V_{CC}	-0.5 to 7.0	V
Output Voltage	V_{OUT}	-0.5 to V_{CC}+0.5	V
Output Current	I_{OUT}	± 10	mA
Storage Temperature	T_{STG}	-55 to +125	°C

NOTE: Permanent device damage may occur if the above Absolute Maximum Ratings are exceeded. Functional operation should be restricted to the conditions as detailed in the operational sections of this data sheet. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.



Plastic Package
FPT-20P-M01

Pin Assignment



Pin Assignment might be changed to improve the characteristics without notice.

This device contains circuitry to protect the inputs against damage due to high static voltages or electric fields However, it is advised that normal precautions be taken to avoid application of any voltage higher than maximum rated voltages to this high impedance circuit.

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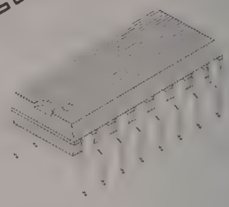
DATA SHEET

MB87091
SERIAL INPUT PLL FREQUENCY SYNTHESIZER

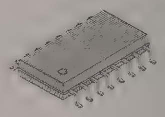
CMOS SERIAL INPUT PLL FREQUENCY SYNTHESIZER WITH POWER SAVING FUNCTION

The Fujitsu MB87091 is a CMOS serial input Phase Locked Loop (PLL) frequency synthesizer ideal for use in cordless telephone sets and other radio equipment. It incorporates an inverter for an oscillation circuit, a programmable reference divider (14–bit binary programmable reference counter), a shift register control register, latches, a programmable divider (6–bit binary swallow counter with 12–bit binary programmable counter and dual modulus prescaler), a phase comparator, an intermittent mode control circuit, and a constant–current charge pump. The power save control input pin (PS) for the intermittent mode control circuit is used to switch between the stand–by and active modes. This is used for phase synchronization at the beginning of operation. The MB87091 permits construction of PLL frequency synthesizers with operating frequencies of up to 380 MHz.

PRELIMINARY



(DIP-16P-M04)

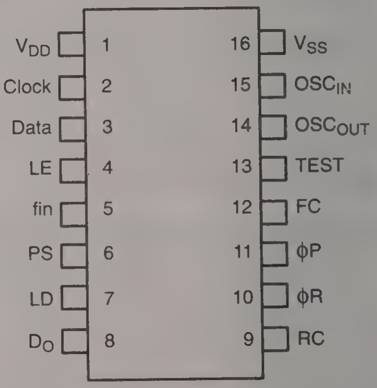


(FPT-16P-M06)

FEATURES

- Single power supply voltage: V_{DD} = 2.7 to 3.3V
- Built–in inverter for an oscillator
- Adjustable output current of the charge pump with an external resistor
- Intermittent mode control circuit
- Two phase comparator outputs (for external and internal charge pumps)
- Wide operating temperature range (T_A) –40°C to 60°C
- Plastic dual in line package(Suffix:–P), Plastic small outline package(Suffix:–PF)
- Setting the divide ratio
  Use the below formula to define the parameters for setting the divide ratio
  $\underline{f_{VCO}} = (\underline{N} \times \underline{M} \div \underline{A}) \times (\underline{f_{OSC}} \div \underline{R})$ (N>A)
  (1) (2) (3) (4) (5) (6)
  (1) Output frequency of the external VCO
  (2) Preset divide ratio of 12–bit binary programmable counter (5 to 4,095)
  (3) Preset modulus of external dual modulus prescaler (64)
  (4) Preset divide ratio of 6–bit binary swallow counter (0 to 63)
  (5) Output frequency of the external reference frequency oscillator
  (6) Preset divide ratio of 14–bit binary programmable reference counte (5 to 16,383)

PIN ASSIGNMENT
(TOP VIEW)



This device contains circuitry to protect the inputs against damage due to high static voltages or electric fields. However, it is advised that normal precautions be taken to avoid application of any voltage higher than maximum rated voltages to this high impedance circuit.

ABSOLUTE MAXIMUM RATINGS (See NOTE)

(V_{SS}=0V)

Rating	Symbol	Value	Unit
Supply voltage	V_{DD}	V_{SS}–0.5 to V_{SS}+6.0	V
Input voltage	V_{IN}	V_{SS}–0.5 to V_{DD}+0.5	V
Output voltage	V_{OUT}	V_{SS}–0.5 to V_{DD}+0.5	V
Output current	I_{OUT}	±10	mA
Ambient temperature	T_A	–40 to +60	°C
Storage temperature	Tstg	–40 to +125	°C
Power dissipation	P_D	300	mW

NOTE: Permanent device damage may occur if the above **Absolute Maximum Ratings** are exceeded. Functional operation should be restricted to the conditions as detailed in the operational sections of this data sheet. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

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Edition 1.0

FUJITSU

DATA SHEET

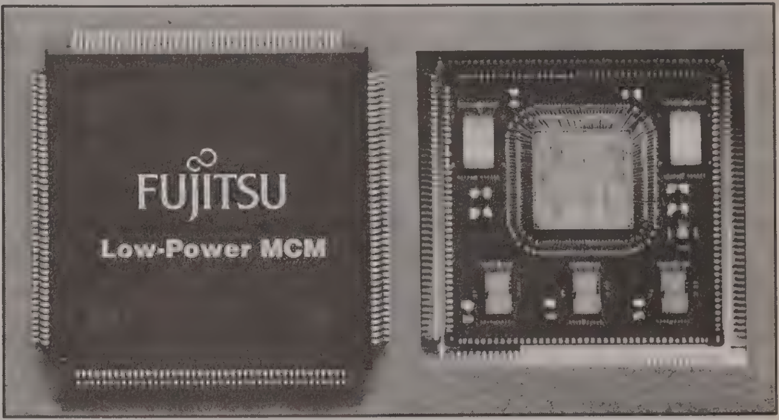
Fujitsu Multichip Modules
Low-Power MCMs

Description

Fujitsu's Low-Power Multichip Module (MCM) is the most cost effective advanced packaging solution to solve the speed and density barriers imposed by traditional packaging and interconnection approaches.

Our MCM family is built on a multilayer ceramic substrate with a semiconductor die mounted on both sides and housed in a surface mountable plastic quad flat package.

Some of the features and their benefits are listed below.



Features	Benefits
• Highest component density possible with dual side mounting	—Maximizes system performance and integration
• Excellent control of transmission line parameters	—Reduces ringing and signal reflection
• 100% module testing	—High reliability
• Inclusion of both analog and digital functions	—Mixed signal
• I/O configuration options: 80, 104, 168, and 256 pins	—Standard package sizes
• Package mount height options: 4.4 mm and 3.0 mm	—Low profile

Product Applications

- Telecommunications equipment
- Portable computers
- High speed workstations
- Industrial controls
- ATE/ instrumentation
- Hand-held POS terminals
- Computer peripherals
- Multimedia

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FUJITSU

DATA SHEET

CG31 Series

0.8-micron CMOS Gate Arrays

DESCRIPTION

The CG31 series of 0.8μm CMOS gate arrays are currently available in three device types with from 120K to 200K gates. These arrays achieve the ultra fast speed of 0.37 ps per gate. Thank to the channelless (sea-of-gates) structure of the CG31 gate array, CG31 basic cells can be used for logic cells, memory cells, or wiring area in order to implement the desired functions. The full utilization of the array surface and the three-layer metal interconnect technology produce a 65 percent maximum gate usability ratio

The logic and I/O cells for the CG31 series are functionally compatible with Fujitsu's AU, UHB, CG10, and CG21 series of gate arrays to simplify upgrading. User-specifiable RAM and ROM configurations are also available, These are arrays facilitate the implementation of large-scale devices such as computers and graphic processors on single chips.

FEATURES

- 0.8 micron CMOS sea-of-gates technology
  - 3 layer metal interconnect
- Ultra high speed
  - 0.37 ns/gate for 2-input NAND with F/O=2
  - 0.55 ns/gate for power 2-input NAND with F/O=2
- High basic cell usage
  - 65% maximum for logic with RAM/ROM
  - 55% maximum for logic only
- High sink current capability
  - sink current up to 12mA planned
- Minimum delay clock buffer true option
- High current clock drivers
  - Low-skew clock signal distribution
- Extensive unit cell library (logic cell, RAM, ROM, PLA, etc.)
  - Unit cells functionally compatible with Fujitsu's AU, UHB, CG10, and CG21 series gate arrays
- Automatic test pattern generation optional with Fujitsu scan testing
- On-chip pull-up/pull-down resistors
- High pin count ceramic packages
- High-density RAM and ROM compilers
  - up to 18K bit RAM block
  - up to 64K ROM block

PRODUCT FAMILY

Device	Available BCs (2-input gate +4 N-ch Tr)	Usable Logic Basic Cells (55% utilization)	Max Signal I/O
CG31134	V_{CC}	71 K	300
CG31134	V_{IN}	88 K	332
CG31134	V_{OUT}	115 K	332*

Note: Package constrained

AVAILABLE PACKAGE[1]

Package	CG31134	CG31164	CG31204	Type
PGA-135	●	●	⊕	Cavity up
PGA-155	⊕	⊕	⊕	Cavity down
PGA-179	●	●	⊕	Cavity up
PGA-208	●	●	⊕	Cavity up
PGA-223	⊕	⊕	⊕	Cavity down
PGA-256	●	●	⊕	Cavity up
PGA-299	⊕	⊕	⊕	Cavity down[2]
PGA-321	⊕	⊕	⊕	Cavity down[2]
PGA-361	⊕	⊕	⊕	Cavity down[2]
PGA-401	⊕	⊕	⊕	Cavity down[2]

Notes: 1. All packages are ceramic pan grid arrays (PGAs)
2. These packages features 70-mil interstitial pin arrangement and metal heatspreader with optional heatsink
● =available
⊕ =under development

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FUJITSU

DATA SHEET

CMOS Embedded Arrays

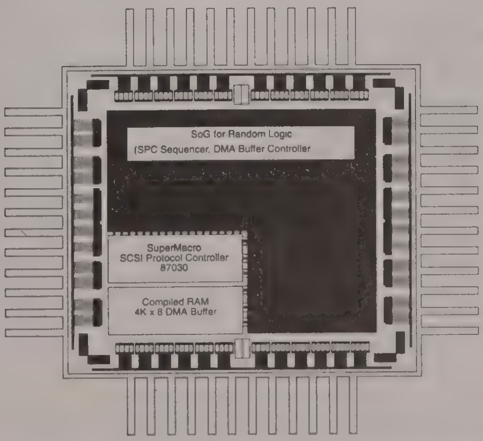
Fujitsu's advanced embedded array technology combines the fast, flexible logic implementation of Fujitsu's sea-of gates arrays with the high performance hardware macros offered by Fujitsu's standard cells. The result is a high-performance device that maximizes overall ASIC performance while minimizing cost, turnaround time, and customer.

Embedded arrays can be implemented using Fujitsu's 0.8-micron or sea-of-gates technology for logic cells and any of the compiled RAM/ROM/datapath operator cells available through Fujitsu's standard cell technology.

The development of embedded arrays is a concurrent process, providing time and cost savings to the designer. Once the designer identifies the embedded functions, Function begins base wafer fabrication. Simultaneously with base wafer production, the customer defines and simulates the logic requirements of the array. This concurrent process results in shorter turnaround time for prototypes. Embedded arrays also offer cost savings if alternations to the design are necessary. Typically, pre-defined functions of the array remain unchanged and, therefore, alterations are not as costly as re-designing from the base wafer.

- All-layer base wafer fabrication
  - Maximum ASIC performance
  - Optimum size/performance ratio
  - Highest compiled cell density
- Flexible logic implementation using proven CMOS 0.8-micron or 1.2-micron sea-of-gates architecture
  - for 0.8-micron:
    - all CG21/CG31 unit cells available
    - 370 ps/gate delay (F/O = 2, 2 mm wire)
    - up to 200K gates available
  - for 1.2-micron:
    - all CG21/CG31 unit cells available
    - 370 ps/gate delay (F/O = 2, 2 mm wire)
    - up to 200K gates available
- Wide choice of compiled cells
  - High speed RAM
  - High density RAM
  - ROM
- Custom crafted I/O cells
- Industry standard and proprietary functions including SuperMacros™ from ASIC Gallery™
  - Peripheral functions
  - SCSI and Ethernet™ macros
  - JTAG IEEE 1149.1 boundary Scan Macros
- Supported by popular commercial design tools
  - Cadence
  - Dazix
  - Mentor
  - Valid
  - Viewlogic
  - Synopsys
- Mask-metal-only prototype cycle
  - fast turnaround time
  - low risk customer corrections
  - maximum customer options
- Customary bonding pad locations in established production die frame outlines
- No special testing requirements

Peripheral Controller: An example of an application of embedded arrays



This peripheral controller serves as an interface between the host and peripheral such as disk drives of printer. The embedded functions include a SCSI SuperMacro and a compiled singled-port RAM.

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MB86970

FUJITSU

INTELLIGENT CONTROLLER FOR ETHERNET WITH 10BASE-T

APRIL1993

FEATURES

Host Interface Features

- LANCE-compatible architecture and buffer management structure with enhancements to ease programming, improve performance, and enhance flexibility
- Selectable 32-bit EISA or 486-compatible bus modes
- Non-multiplexed 32-bit address and data buses
- Operation as 32-bit bus master or 16/32-bit bus slave
- Supports bus preemption with preemption time programmable up to 64 bus clocks
- Page-boundry detection in bus master mode for page accesses to DRAM
- Generates chip select and read signals to access external ID PROM and boot PROM
- Direct and indirect (LANCE-compatible) addressing of all internal registers
- Initialization via direct access to initialization register set, or via initialization block in shared memory
- 33 Mbyte/sec data throughput in EISA mode and 80 Mbyte/sec data throughput in 486 mode

Ethernet Controller Features

- Transmit and receive descriptor rings each support up to 512 entries
- Enhanced transmit buffer descriptor includes collision count, enable/disable CRC and carrier sense status
- Enhanced receive buffer descriptor identifies packet as Broadcast, Multicast, Runt or Loopback type
- 128-byte FIFO auto-configured for most efficient use during transmit and receive operations
- Programmable transmit and receive FIFO threshold and burst size
- Four 16-bit counters with programmable interrupt level to allow automatic gathering of statistics on any of 15 events
- 32-bit programmable timer with interrupt
- Hash filter for multicast packet reception

Media Interface Features

- Direct interface to AUI and 10BASE-T outputs
- Fully compliant with IEEE 802.3 specifications
- Automatic AUI /10BASE-T selection
- Integrated pulse shaper and transmit and receive filters
- Selectable 100/150 ohm termination permits operation with shielded or unshielded twisted-pair cable
- Reverse-polarity detection and correction
- On-chip jabber logic, link test and SQE test with enable/disable options
- Output drivers for LEDs to indicate receive, transmit, collision and link-test pass

General Features

- Powerdown mode reduces power dissipation
- Low-power CMOS technology
- Single 5-volt power supply
- 160-pin, plastic quad flat package

DESCRIPTION

Fujitsu's MB86970 Intelligent Controller for 10BASE-T Ethernet (ICE-T), is a single-chip, high performance, 16-/32-bit Ethernet controller for adapter card and motherboard applications. It incorporates a fully IEEE 802.3 compliant Ethernet encoder/decoder, 10BASE-T transceiver and pulse shaper and filters and features two selectable bus interface modes. In the EISA-compatible mode it provides 32-bit bus master operation with both single cycle and burst read and write capability or 16-/32-bit bus slave access to all internal registers. In its 486-compatible mode, useful for the construction of motherboards or other systems with integrated Ethernet capability, the MB86970 can operate as a 32-bit bus master or 16-/32-bit bus slave at a bus clock rate of up to 40 MHz.

The programming model for the MB86970 is based on the LANCE architecture, which allows previously developed software to be used with little or no modification. Numerous enhancements have been incorporated to ease programming, improve performance and enhance flexibility. For example, the size of the transmit and receive buffer descriptor rings are

MB86965

FUJITSU

ETHERCOUPLER SINGLE-CHIP ETHERNET CONTROLLER

DATA SHEET

APRIL1993

FEATURES

- Provides interface to the I/O bus of PC/XT™/AT® or compatible computers
- Optional, generic host interface to connect to industry-standard microprocessor buses
- Interface to serial EEPROM for Node ID and configuration option storage allows construction of jumperless, electronically configurable adapter cards
- Automatic polarity detection and correction on twisted-pair 10BASE-T cable
- Allows automatic selection of nonconflicting I/O address for self-installing under software control
- High-performance, packet-buffer architecture pipelines data for highest throughput
- On-chip buffer management controls buffer pointers to reduce software overhead and improve performance
- Hash filter for multicast packet reception
- Manchester encoder/decoder tolerates input jitter up to ±18 ns
- Fully compliant with ISO/ANSI/IEEE 8802-3 specifications
- Two network ports, AUI and 10BASE-T, with automatic port selection
- Integrated pulse shape, and transmit and receive filters
- Selectable 150Ω and 100Ω termination for shielded or unshielded twisted-pair cable, respectively
- Powerdown mode to reduce power dissipation in battery-powered equipment
- Low-power CMOS technology
- Single 5-volt power supply
- 160-pin plastic quad flat package (PQFP)

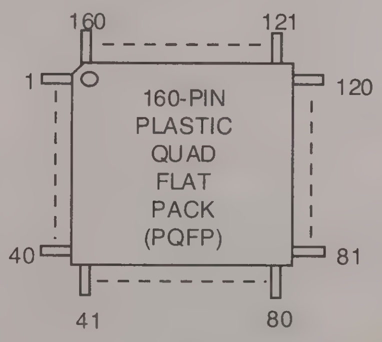
GENERAL DESCRIPTION

The MB86965 EtherCoupler™ Controller is a high-performance, highly integrated monolithic device that incorporates a network controller with buffer management, 10BASE-T transceiver with on-chip transmit and receive filters, Manchester encoder/decoder, and bus interface for a PC/XT/AT/ISA bus. EtherCoupler allows implementation of adapter solutions with as few as four chips. With its optional native bus mode for use directly on a microprocessor bus, it is ideal for use on daughter and motherboards, as well as expansion-bus adapter boards. An EEPROM can be interfaced to the chip for storage of Ethernet ID and configuration settings. EtherCoupler is designed to be configured electronically, thus eliminating the jumpers typically used to configure the system network adapters.

The buffer management architecture of the MB86965 allows packet data to access a buffer memory area simultaneously from the host and from the network media. The network controller updates all receive and transmit pointers automatically to reduce the software overhead needed to control these operations, which results in superior benchmark speed and application performance. EtherCoupler's transmit buffer is programmable as a single 2-kbyte bank or as two banks of 2, 4, or 8 kbytes each. This buffer chains multiple data packets and transmits them to the network from a single transmit command, thereby offering greater design flexibility and throughput. A ring buffer that can be sized from 4 to 62 kbytes, depending on the amount of available memory used for the transmit buffer, captures the receive packets.

The MB86965 performs pulse shaping and filtering internally, which eliminates the need for external filtering components and reduces overall system cost.

PIN CONFIGURATION



TOP VIEW

MB86961/MB86961A

FUJITSU

UNIVERSAL INTERFACE FOR 10BASE-T (TWISTED-PAIR) ETHERNET

DATA SHEET

APRIL1993

Note: All descriptions apply to both MB86961 and MB86961A unless otherwise noted.

FEATURES

- Combines Manchester encoder/decoder and twisted pair transceiver functions
- Direct interface to all popular Ethernet controllers
- Direct interface to AUI and 10BASE-T outputs
- Manual or automatic AUI /10BASE-T selection
- Integrated pulse shaper and Tx/Rx filters
- Selectable 100 Ω/150 Ω termination permits operation with shielded or unshielded twisted pair cable
- Reverse-polarity detection for receiver with automatic correction
- On-chip jabber logic, SQE test and link test with enable/disable option
- Remote signaling of link down and jabber conditions
- Programmable receive threshold for extended range
- Power down mode for minimum power dissipation
- Output drivers for receive, transmit, collision and link test pass LED indicators
- Low power CMOS technology, single 5 volt power supply
- TP loopback disable for external loopback testing (MB86961A only)
- 44-pin PLCC package

Additional features in MB86961A only

- Automatic shut-down of unused port
- TP external loopback enable for testing

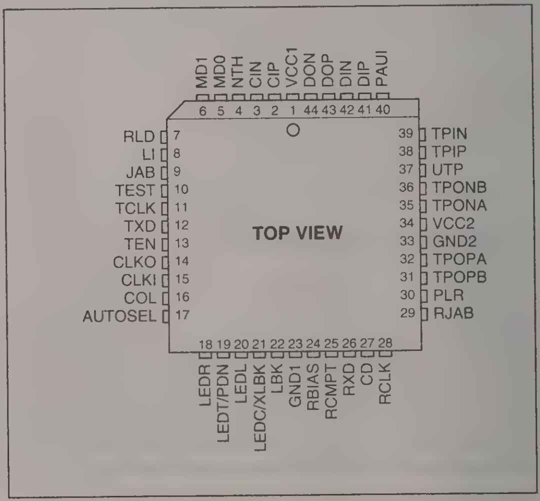
GENERAL DESCRIPTION

The MB86961(A) Universal Interface for 10BASE-T (Twisted-Pair) Ethernet is fully compliant with the IEEE 802.3 specifications for AUI (Attachment Unit Interface) and 10BASE-T (Twisted-Pair) interfaces and provides the electrical interface between an Ethernet controller and the DB15 (AUI) and RJ45 (10BASE-T) connections to an Ethernet local area network. Functions provided by the MB86961(A) include Manchester encoding and decoding of the serial data stream, level conversion, collision detection, signal quality error (SQE) and link integrity testing, jabber control, loopback, and automatic correction of polarity reversal on the twisted-pair input.

Pulse shaping and filtering functions are performed by the MB86961(A) to eliminate the need for external filtering components and thus reduce overall system cost. The device also provides outputs for receive, transmit, collision and link test LEDs and provides compatibility with both shielded and unshielded twisted pair cables. The receive threshold can be reduced to allow an extended range between nodes in low noise environments. Its wide range of features and its ability to interface to virtually all popular controllers make the MB86961(A) the ideal device for twisted pair Ethernet applications.

The MB86961(A) is part of a complete family of Ethernet devices available from Fujitsu. It is fabricated in a low-power CMOS technology and is supplied in a 44-pin PLCC package.

PIN CONFIGURATION


MD1 6
MD0 5
NTH 4
CIN 3
CIP 2
VCC1 1
DON 44
DOP 43
DIN 42
DIP 41
PAUI 40
RLD 7
LI 8
JAB 9
TEST 10
TCLK 11
TXD 12
TEN 13
CLKO 14
CLKI 15
COL 16
AUTOSEL 17
TOP VIEW
39 TPIN
38 TPIP
37 UTP
36 TPONB
35 TPONA
34 VCC2
33 GND2
32 TPOPA
31 TPOPB
30 PLR
29 RJAB
18 LEDR
19 LEDT/PDN
20 LEDL
21 LEDC/XLBK
22 LBK
23 GND1
24 RBIAS
25 RCMPT
26 RXD
27 CD
28 RCLK

MB86930

FUJITSU

SPARClite™ 32-BIT RISC EMBEDDED PROCESSOR

PRELIMINARY INFORMATION

JANUARY 1993

FEATURES

- 40 MHz (25ns/cycle) operating frequency
- SPARC® high-performance RISC architecture
- 2 Kbytes 2-way set associative instruction cache
- 2 Kbytes 2-way set associative data cache
- Flexible locking mechanism for data and instruction cache entries
- Harvard-style separate instruction and data buses on-chip
- 8 window, 136 word register file
- Fast interrupt response time
- 247 address spaces, 4 Gbyte each
- User and supervisor modes
- Buffered writes and instruction pre-fetching
- Fast page-mode DRAM support
- Programmable address decoder and wait-state generator
- 16-bit auto reload timer
- On-chip clock generator circuit
- JTAG test interface
- Emulator support hardware
- Single vector trapping
- 0.8 micron gate, 3 level metal CMOS technology

GENERAL DESCRIPTION

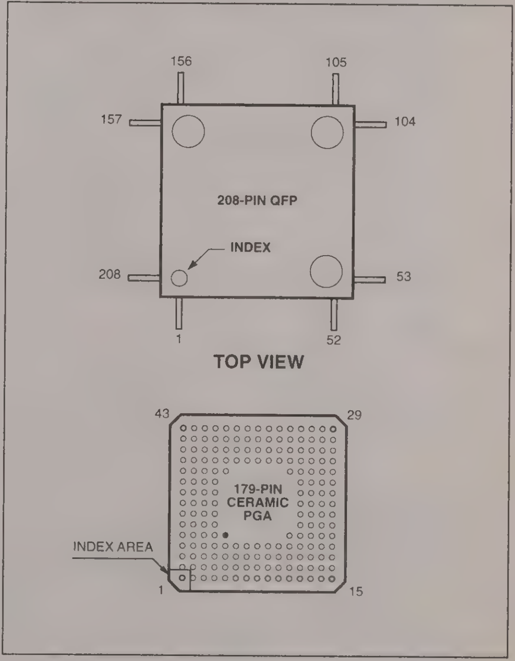
The MB86930 is a member of the SPARClite series of RISC processors which offers high performance and high integration for a wide range of embedded applications. The processor is based on the SPARC architecture and is upward code compatible with previous implementations. At 40 MHz, the processor executes with 40 MIPs peak and 37 MIPs sustained performance.

On-chip data and instruction caches are included to help decouple the processor from external memory latency. Separate on-chip instruction and data paths provide a high bandwidth interface between the IU and caches. Included to maximize the performance of the system with minimum glue logic, are chip select outputs, programmable wait-state generation and built-in support for a high performance connection to page-mode DRAM. See MB86930 block diagram on page 5.

Support for debug and diagnostic tools has been included on-chip and allows for direct connection to hardware emulators and improves debug capability when using ROM based monitors.

These features combine to give the MB86930 superior speed, flexibility and efficiency to make it the ideal choice for a wide variety of low-cost, high-performance embedded systems.

PIN CONFIGURATION



MB86932

FUJITSU

SPARClite™ 32-BIT RISC EMBEDDED PROCESSOR

PRELIMINARY INFORMATION

JANUARY 1993

FEATURES

- 40 MHz (25ns/cycle) operating frequency
- SPARC® high performance RISC architecture
- 8 Kbytes 2-way set associative instruction cache
- 2 Kbytes 2-way set associative data cache
- Support for burst mode cache fills
- Flexible locking mechanism for data and instruction cache entries
- Harvard-style separate instruction and data buses on-chip
- 8 window, 136 word register file
- Fast interrupt response time
- 247 address spaces, 4 Gbyte each
- 16 entry TLB (Translation Lookaside Buffer)
- Buffered writes and instruction pre-fetching
- Fast page-mode DRAM support
- 2 channel DMA controller
- Support for execution out of 8, 16, or 32-bit wide boot memory
- Parity generation and checking
- Programmable address decoder and wait-state generator
- 16-bit auto reload timer
- On-chip clock generator circuit
- JTAG test interface
- Emulator support hardware
- Single vector trapping
- 0.8 micron gate, 3 level metal CMOS technology

GENERAL DESCRIPTION

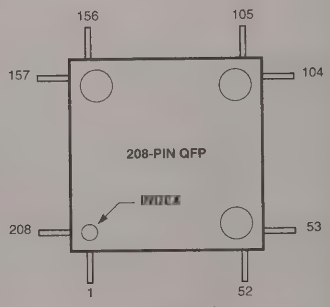
The MB86932 is the fourth of the SPARClite series of RISC processors which offers high performance and high integration for a wide range of embedded applications. The processor is based on the SPARC architecture and is upward code compatible with previous implementations. At 40 MHz, the processor executes with 40 MIPs peak and 37 MIPs sustained performance.

On-chip data and instruction caches are included to help decouple the processor from external memory latency. Separate on-chip instruction and data paths provide a high bandwidth interface between the IU and caches. An on-chip 2-channel DMA controller makes use of the processor bus even while the integer unit is executing out of cache. Support for virtual memory and access protection is provided through the on-chip Translation Lookaside Buffer (TLB). Included to maximize the performance of the system with minimum glue logic, are chip select outputs, programmable wait state generation, built-in support for a high performance connection to page-mode DRAM and support for booting from 8 and 16-bit memory. See MB86932 block diagram on page 3.

Support for debug and diagnostic tools has been included on-chip and allows for direct connection to hardware emulators and improves debug capability when using ROM based monitors.

These features combine to give the MB86932 superior speed, flexibility and efficiency to make it the ideal choice for a wide variety of low cost, high performance embedded systems.

PIN CONFIGURATION



TOP VIEW

MB86933 PRELIMINARY

FUJITSU

SPARClite™ 32-BIT RISC EMBEDDED PROCESSOR

ADVANCE INFORMATION

JANUARY 1993

FEATURES

- 20 MHz (50ns/cycle) operating frequency
- SPARC® high performance RISC architecture
- 6 window, 104 word register file
- Fast interrupt response time
- 16 address spaces, 256 Mbyte each
- User and supervisor modes
- Fast page-mode DRAM support
- Programmable address decoder and wait-state generator
- Support for execution from 8, 16, and 32-bit wide boot memory
- 16-bit auto reload timer
- On-chip clock generator circuit
- JTAG test interface
- Single vector trapping
- 0.8 micron gate, 3 level metal CMOS technology

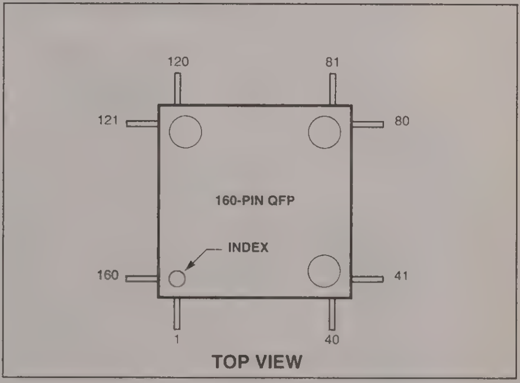
GENERAL DESCRIPTION

The MB86933 is the next of the SPARClite series of RISC processors which offers high performance and low cost for a wide range of embedded applications at the most agressive price point of any SPARC processor. The processor is based on the SPARC architecture and is upward code compatible with previous implementations. At 20 MHz, the processor executes with 20 MIPs peak and 18 MIPs sustained performance.

Included to maximize the performance of the system with minimum glue logic, are chip select outputs, programmable wait state generation and built-in support for a high performance connection to page-mode DRAM. See MB86933 block diagram on page 3.

These features combine to allow the MB86933 to offer high performance and SPARC compatibility at a low cost to make it the right choice for a wide range of cost sensitive yet performance oriented embedded designs.

PIN CONFIGURATION



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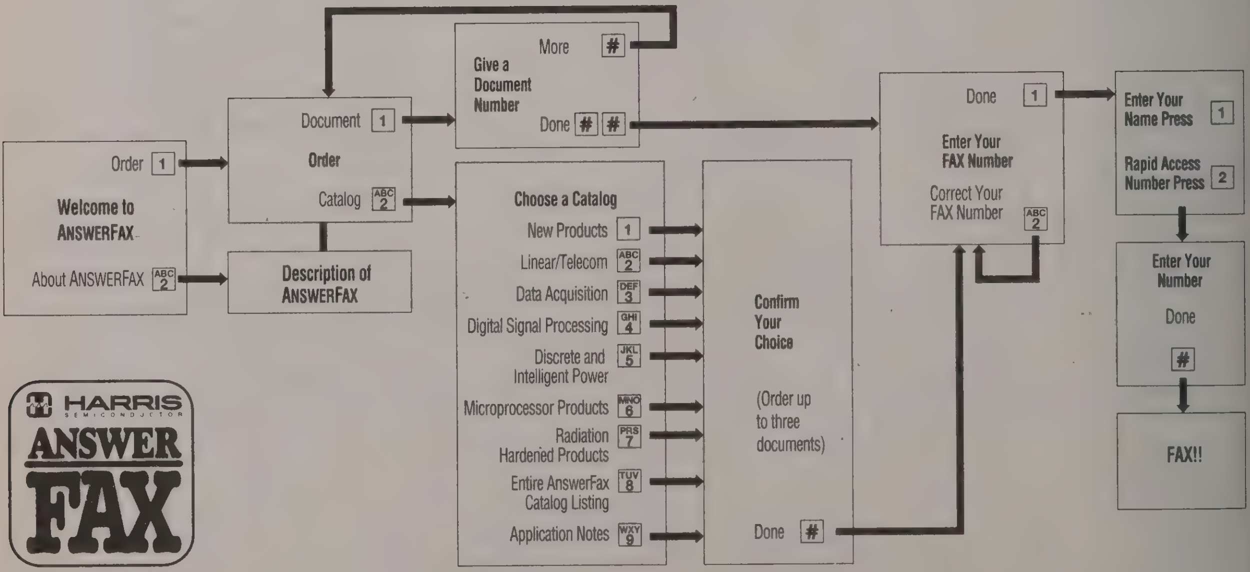
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New Products From Harris Semiconductor

LINEAR CIRCUITS	DESCRIPTION	ANSWER FAX DOCUMENT NO.
Buffers		
HFA1110	+1 Buffer Pinout	2944
HFA1112	-1, +1, +2 Op Amp Pinout	2992
HFA1113	+2, +1, -1 Op Amp Pinout, Clamped Output	1342
Single Op Amps		
HA-2842	$A_V \geq 2$, Cable Driver	2766
HFA1100	$A_V \geq 1$, CFB	2945
HFA1120	HFA1100 w/Offset Adjust	2945
HFA1130	$A_V \geq 1$, CFB, Prog Output Clamps	3369
HA-2544	$A_V \geq 1$	2900
HA-2841	$A_V \geq 1$, Low Icc	2843
HFA1105	$A_V \geq 1$, Low Icc, CFB	3395
HFA1106	HFA1105 w/Compensation Pin	3395
HFA1135	$A_V \geq 1$, Low Icc, CFB, Prog Output Clamps	3395
HFA1145	$A_V \geq 1$, Low Icc, CFB, Output Disable	3395
Quad Op Amps		
HA-5024	$A_V \geq 1$, CFB	3550
HA-5025	$A_V \geq 1$, CFB	3591
HA-2444	$A_V \geq 1$, 4-Channel Muxed Output	2490
Transistor Arrays		
HFA3127/28, HFA3046/96	5npn	3076
SPECIAL FUNCTION		
HA-2546/47	Quad Multiplier	2861/2862
HA-2556/57	Quad Multiplier	2477/2478
HA-7210	Crystal Oscillator - Very Low Power	3389
SWITCHES AND MUXES		
DG400 Series	Analog Switches/ Muxes	7050
HI201HS	Quad Video Switch	3123
HI222	Dual Video Switch	3124
HI524	4-Channel Video Mux	3148
DSP		
HSP45256	Correlator	2814
HSP43124	Serial I/O Filter	3555
HSP9520/21	Multifunction Pipeline Register	2811
HSP43168	Dual FIR Filter	2808
HSP43220	Decimating Digital Filter	2486
HSP43481	Digital Filter	2759
HSP43881	Digital Filter	2758
HSP43891	Digital Filter	2785
HSP45102	12-bit NCO	2810
HSP45106	16-bit NCO	2809
HSP45116	NCOM	2485
HSP45240	24-bit Address Sequencer	2489
HSP48410	Histogrammer	3185
HSP48901	3 x 3 Image Filter	2459
HSP48908	Two DImensional Convolver	2456
HSP9501	Programmable Data Buffer	2786
HSP43216	Halfband Filter	3365

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HIP4080	80V Full Bridge FET Driver	3178
HIP4081	80V Full Bridge FET Driver	3556
HIP2500	500V Half Bridge MOSFET Driver	2801
SP600	500V Half Bridge MOSFET Driver	2428
SP601	500V Half Bridge MOSFET Driver	2429
HIP5500[1]	500V Half Bridge MOSFET Driver — PWM Oscillator	3210
HV400	Power MOSFET Driver — 300 KHz	2850
ICL7667	Power MOSFET Driver — 200 KHz	2853
HIP4011	3 Phase Motor Drive	2939
HIP0080[1]	36V Quad DMOS Output Driver With Diagnostic Interface	3018
HIP0081[1]	80V Quad DMOS Output Driver With Diagnostic Interface	3018
CA3242	Quad Inverting Power Driver	1561
CA3262	Quad Inverting Power Driver — Output Current Limiting	1836
CA3272	Quad Inverting Power Driver — Thermal Shutdown	2223
CA3274	Power MOSFET Driver — Current Limiting	2222
CA3282	Octal Serial Solenoid Driver With SPI Interface	2767
CA3292[1]	Quad Inverting Power Driver With Output Protection Clamp	2946
HIP1030[1]	1A High Side Driver With Overload Protection	2788
HIP1031[1]	0.5A High Side Driver With Transient Protection	3596
HIP1090	1A High Side Driver With Transient Protection	3398
HIP5060	Switching Regulator — single output, full feature	3207
HIP5061	Switching Regulator — single output, low cost	3390
HIP5062	Switching Regulator — dual/triple output	3208
HIP5063	Switching Regulator — single output, reduced feature	3209
HV2405E	Offline AC/DC Power Supply With DC Regulator	2487
HIP3600[1]	Offline AC/DC Converter With Programmable Output	3623
HIP5600[1]	AC/DC or DC/DC 3-Terminal Regulator	3270
CA3277	Dual Linear Regulator	2792
CA3059	ZVS Triac Driver	490
CA3275	Dual H Bridge	2159
CA3273	High Side Driver	2113
ICL7660	CMOS Voltage Converter	3072
ICL7660S	Super Voltage Converter	3179
ICL7662	CMOS Voltage Converter	3181
ICL7663S	CMOS Programmable µpower Voltage Regulator	3180
ICL7665S	CMOS µpower Over/Under Voltage Detector	3182
ICL7673	Automatic Battery Backup Switch	3183
ICL8211/2	Programmable Voltage Detectors	3184
DISCRETE POWER		
Power MOSFETS	Request Catalog #5	
IGBTs	Request Catalog #5	
MCTV35P60F1	35A, 600V P-Type MOS	3602
MCTX65P100F1	65A, 1000V P-Type MOS	3516
MCTX75P60E1	75A, 600V P-Type MOS	3374
PROTECTION		
SP720	ESD And Overvoltage Protection Array (14 Lines)	2791
SP721	ESD And Overvoltage Protection Array (6 Lines)	3590
ML Series	Multilayer Transient Voltage Suppressors	2461
LA/ZA Series	Radial Lead Transient Surge Suppressors	2190, 2184
HA Series	Heavy-duty Surge Protectors (130 - 2800 VAC)	2973

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HIGH SPEED DATA CONVERTERS

Analog to Digital Converters

P/N	Features	Resolution (bits)	Conversion Rate (min) (MSPS)	Bandwidth (MHz)	Power Dissipation (mW)	Logic Type	Answer Fax (Doc #)
HI5800	12-bit A/D Conversion System	12	3	20	1800	CMOS/ TTL	2938
HI1276	Wideband Flash A/D	8	500	300 (min)	2800	ECL	3578
HI1166	Low Power Wideband Flash A/D	8	250	200 (min)	1400	ECL	3579
HI1396	Accurate Wideband Flash A/D	8	125	200 (min)	870	ECL	3576
HI1386	Wideband Flash A/D	8	75	150 (min)	580	ECL	3583
HI1176	HI1175 with Sync Clamp, Clamp Pulse Generator, DC Restore	8	20	18	60	TTL	3582
HI1175	Very Low Power Flash A/D with Voltage Reference	8	20	18	60	TTL	3577
HI5700	Very Low Cost 8-bit Flash A/D	8	20	18	725	TTL	3174
CA3318	Rugged 8-bit Flash A/D	8	15	2.5	150	TTL	3103
HI5701	Low Cost 6-bit Flash A/D	6	30	20	250	CMOS/ TTL	2937
CA3306	Low Power Flash A/D	6	15	30	70	TTL	3102
CA3304	Low Power Flash A/D	4	25	40	25	TTL	1790

Digital to Analog Converters

			Update Rate (MHz)	Glitch Area (pV-s)			
HI20201	Voltage Output, Analog Multiplying Function, 75Ω Drive Capacity	10	160	15	420	ECL	3581
HI20203	8-bit Version of HI20201	8	160	15	420	ECL	3581
HI1171	Very Low Power Video DAC with Current Output	8	40	30	65	TTL	3580
CA3338	Low Power Video DAC with Voltage Output	8	50	150	100	CMOS/ TTL	1850

Typical Values @ 25°C unless otherwise specified.

ANALOG/DIGITAL STANDARD CELL

PRODUCT	TECH	MINIMUM FEATURE	PROGRAM LAYERS	INTEGRATION	SUPPLY VOLTAGE	F_T (GHz) NPN/PNP	DESIGN SYSTEM	COMMENTS
HBC2500	BiCMOS	3.0	ALL	2500 dig/100 analog	3-15	0.6/0.35	FASTRACK	
HPA2000	BiCMOS	4.0	ALL	1000 dig/10 analog	15-60	1.5/0.02	FASTRACK	60V DMOS
HBC1000	BiCMOS	2.0	ALL	10000 dig/100 analog	5-10	4.0/1.50	CUSTOM	
HDI1000	40V DI	11.0	ALL	500 dig/25 analog	40	0.7/0.40	FASTRACK	
HDI2000	20V DI	10.0	ALL	700 dig/30 analog	20	1.2/1.00	FASTRACK	

ANALOG TILE ARRAYS

PRODUCT	TECH	MINIMUM FEATURE	PROGRAM LAYERS	INTEGRATION	SUPPLY VOLTAGE	F_T (GHz) NPN/PNP	DESIGN SYSTEM	COMMENTS
HTA1000	40V DI	11.0	4	10 op amp equiv.	40	0.7/0.40	FASTRACK	
HTA2000	20V DI	10.0	4	10 op amp equiv.	20	1.2/1.00	FASTRACK	
HTA3000	10V DI	3.0	4	10 op amp equiv.	10	8.0/4.00	FASTRACK	

DEVICE LEVEL

PRODUCT	TECH	MINIMUM FEATURE	PROGRAM LAYERS	INTEGRATION	SUPPLY VOLTAGE	F_T (GHz) NPN/PNP	DESIGN SYSTEM	COMMENTS
HDI1000	40V DI	11.0	ALL	25 op amp equiv.	40	0.7/0.40	FASTRACK	w/CELLS
HDI2000	20V DI	10.0	ALL	30 op amp equiv.	20	1.2/1.00	FASTRACK	w/CELLS
HDI3000	10V DI	3.0	ALL	50 op amp equiv.	10	8.0/4.00	FASTRACK	
HDI4000	80V DI	11.0	ALL	25 op amp equiv.	80	0.3/0.06	FASTRACK	SiCr Res, 200V option

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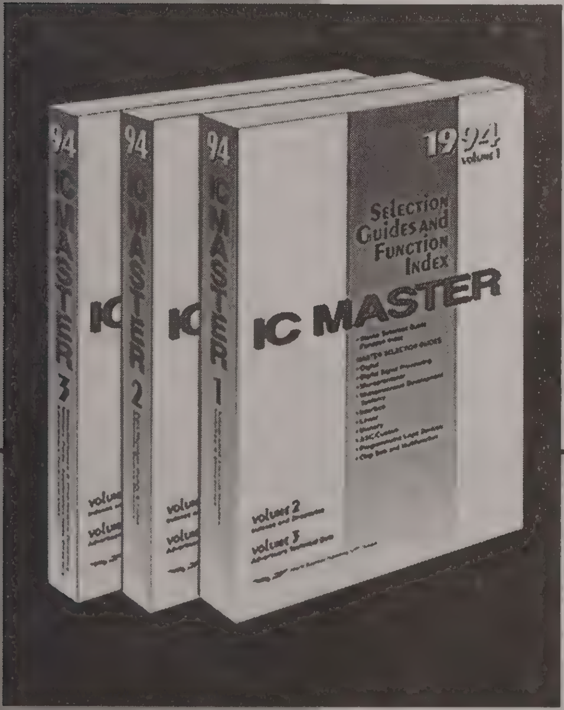

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54/74HCTLS01	Quad 2-Input NAND Gates with Open-Drain Outputs	37	31	40	20
54/74HCTLS02	Quad 2-Input NOR Gates	22	18	40	20
54/74HCTLS03	Quad 2-Input NAND Gates with Open Drain Outputs	37	31	40	20
54/74HCTLS04	Hex Inverters	22	18	40	20
54/74HCTLS05	Hex Inverters with Open-Drain Outputs	37	31	40	20
54/74HCTLS08	Quad 2-Input AND Gates	30	25	40	20
54/74HCTLS09	Quad 2-Input AND Gates with Open-Drain Outputs	37	31	40	20
54/74HCTLS10	Triple 3-Input NAND Gates	22	18	40	20
54/74HCTLS11	Triple 3-Input AND Gates	30	25	40	20
54/74HCTLS12	Triple 3-Input NAND Gates with Open-Drain Outputs	37	31	40	20
54/74HCTLS14	Hex Schmitt-Trigger Inverters	33	28	40	20
54/74HCTLS32	Quad 2-Input OR Gates	26	22	40	20
54/74HCTLS51	Dual AND-OR-Invert Gates	30	25	40	20
54/74HCTLS58	Dual AND-OR Gates	30	25	40	20
54/74HCTLS73A	Dual J-K Negative-Edge-Triggered Flip-Flops with Clear	30	25	80	40
54/74HCTLS74A	Dual D-Type Positive-Edge-Triggered Flip-Flops with Preset and Clear	37	31	80	40
54/74HCTLS76A	Dual J-K Flip-Flops with Preset and Clear	30	25	80	40
54/74HCTLS78A	Dual J-K Flip-Flops with Preset and Common Clear and Clock	30	25	80	40
54/74HCTLS86	Quad 2-Input Exclusive-OR Gates	30	25	40	20
54/74HCTLS107A	Dual J-K Negative-Edge-Triggered Flip-Flops with Clear	30	25	80	40
54/74HCTLS109	Dual J-K Positive-Edge-Triggered Flip-Flops with Preset and Clear	37	31	80	80
54/74HCTLS112A	Dual J-K Triggered Flip-Flops with Preset and Clear	30	25	80	40
54/74HCTLS121	Monostable with Schmitt-Trigger Inputs				
54/74HCTLS123	Dual Retriggerable Monostable Multivibrators				
54/74HCTLS138	3-Line to 8-Line Decoders/Multiplexers	45	37	160	80
54/74HCTLS139	Dual 1-to-4 Line Decoders/Multiplexers	45	37	160	80
54/74HCTLS148	8-Line to 3-Line Priority Encoders	41	34	160	80
54/74HCTLS155	Dual 2-to-4 Line Decoders/Multiplexers	35	29	160	80
54/74HCTLS157	Quad 2-Line to 1-Line Data Selectors/Multiplexers	21	18	160	80
54/74HCTLS158	Quad 2-Line to 1-Line Data Selectors/Multiplexers	21	18	160	80
54/74HCTLS161A	Synchronous 4-Bit Binary Counters	53	44	160	80
54/74HCTLS163A	Synchronous 4-Bit Binary Counters	53	44	160	80
54/74HCTLS164	8-Bit Serial-In/Parallel-Out Shift Registers	54	45	160	80
54/74HCTLS165	8-Bit Serial-In/Parallel-Out Shift Registers	53	44	160	80
54/74HCTLS166	8-Bit Serial-In/Parallel-Out Shift Registers with Clear	45	37	160	80
54/74HCTLS173	4-Bit D-Type Registers with 3-State Outputs	41	34	160	80
54/74HCTLS174	Hex D-Type Flip-Flops with Clear	45	37	160	80
54/74HCTLS175	Quad D-Type Flip-Flops with Clear	37	31	160	80
54/74HCTLS191	Synchronous 4-Bit Up/Down Binary Counters	60	50	160	80
54/74HCTLS193	Synchronous 4-Bit Up/Down Binary Counters with Dual Clock	37	31	160	80
4/74HCTLS240	Octal Buffers and Line Drivers with 3-State Outputs	27	22	160	80
4/74HCTLS241	Octal Buffers and Line Drivers with 3-State Outputs	27	22	160	80
4/74HCTLS244	Octal Buffers and Line Drivers with 3-State Outputs	27	22	160	80
4/74HCTLS245	Octal Bus Transceivers with 3-State Outputs	18	15	160	80
4/74HCTLS257	Quad 2-Line to 1-Line Data Selectors/Multiplexers with 3-State Outputs	27	23	160	80
4/74HCTLS258	Quad 2-Line to 1-Line Data Selectors/Multiplexers with 3-State Outputs	27	23	160	80
4/74HCTLS259	8-Bit Addressable Latches	45	37	160	80
4/74HCTLS266	Quad Exclusive-NOR Gates with Open-Drain Outputs	37	31	40	20
4/74HCTLS273	Octal D-Type Flip-Flops with Clear	40	33	160	80
4/74HCTLS299	8-Bit Universal Shift/Storage Registers with 3-State Outputs	53	44	160	80
4/74HCTLS365A	Hex Bus-Drivers with 3-Bit Outputs	28	24	160	80
4/74HCTLS366A	Hex Bus-Drivers with 3-Bit Outputs	25	21	160	80
4/74HCTLS367A	Hex Bus-Drivers with 3-Bit Outputs	28	24	160	80
4/74HCTLS368A	Hex Bus-Drivers with 3-Bit Outputs	25	21	160	80
4/74HCTLS373	Octal D-Type Transparent Latches with 3-State Outputs	27	23	160	80
4/74HCTLS374	Octal D-Type Flip-Flops with 3-State Outputs	42	35	160	80
4/74HCTLS393	Dual 4-Bit Binary Counters	30	25	160	80
4/74HCTLS399	Quad 2-Part Registers	45	37	160	80
4/74HCTLS533	Octal D-Type Transparent Latches with 3-State Outputs	27	23	160	80
4/74HCTLS534	Octal D-Type Flip-Flops with 3-State Outputs	42	35	160	80
4/74HCTLS540	Octal Buffers and Line Drivers with 3-State Outputs	23	19	160	80
4/74HCTLS541	Octal Buffers and Line Drivers with 3-State Outputs	23	19	160	80
4/74HCTLS563	Octal D-Type Transparent Latches with 3-State Outputs	27	23	160	80
4/74HCTLS564	Octal D-Type Flip-Flops with 3-State Outputs	42	35	160	80
4/74HCTLS573	Octal D-Type transparent Latches with 3-State Outputs	27	23	160	80
4/74HCTLS574	Octal D-Type Flip-Flops with 3-State Outputs	42	35	160	80
4/74HCTLS590	8-Bit Binary Counters with 3-State Output Register				
4/74HCTLS592	8-Bit Binary Counters with Input Register				
4/74HCTLS593	8-Bit Binary Counters with Bidirectional Input Register/Counter Output				
4/74HCTLS640	Octal Bus Transceivers	18	15	160	80
4/74HCTLS643	Octal Bus Transceivers	18	15	160	80
4/74HCTLS646	Octal 3-State Bus Transceivers with Registers	29	24	160	80
4/74HCTLS648	Octal 3-State Bus Transceivers with Registers	29	24	160	80

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ADVANCED HIGH-SPEED CMOS LOGIC PRODUCTS

The 54/74 AHCT Family is a direct plug-in replacement for 54/74ALS.

Part Number	Description	Indicative Max. Speed (ns)		Max. ICC (µA)	
		Mil.	Com'l.	Mil.	Com'l.
54/74AHCT00	Quad 2-Input NAND Gates	12	10	40	20
54/74AHCT01	Quad 2-Input NAND Gates with Open-Drain Outputs	37	31	40	20
54/74AHCT02	Quad 2-Input NOR gates	13	11	40	20
54/74AHCT03	Quad 2-Input NAND Gates with Open-Drain Outputs	37	31	40	20
54/74AHCT04	Hex Inverters	12	10	40	20
54/74AHCT05	Hex Inverters with Open-Drain Outputs	37	31	40	20
54/74AHCT08	Quad 2-Input AND Gates	14	12	40	20
54/74AHCT09	Quad 2-Input AND Gates with Open-Drain Outputs	37	31	40	20
54/74AHCT10	Triple 3-Input NAND Gates	18	15	40	20
54/74AHCT11	Triple 3-Input AND Gates	18	15	40	20
54/74AHCT12	Triple 3-Input NAND Gates with Open Drain Outputs	37	31	40	20
54/74AHCT14	Hex Schmitt-Trigger Inverters	17	14	40	20
54/74AHCT32	Quad 2-Input OR Gates	16	13	40	20
54/74AHCT51	Dual AND-OR-Invert Gates	18	15	40	20
54/74AHCT58	Dual AND-OR Gates	18	15	40	20
54/74AHCT73	Dual J-K Negative-Edge-Triggered Flip-Flops with Clear	20	17	80	40
54/74AHCT74	Dual D-Type Positive-Edge-Triggered Flip-Flops with Preset and Clear	20	17	80	40
54/74AHCT86	Quad 2-Input Exclusive-or Gates	13	11	40	20
54/74AHCT107	Dual J-K Negative-Edge-Triggered Flip-Flops with Clear	20	17	80	40
54/74AHCT109	Dual J-K Positive-Edge-Triggered Flip-Flops with Preset and Clear	20	17	80	40
54/74AHCT112	Dual J-K Negative-Edge-Triggered Flip-Flops with Preset and Clear	20	17	80	40
54/74AHCT121	Monostable Multivibrators with Schmitt-Trigger Inputs				
54/74AHCT123	Dual Retriggerable Monostable Multivibrators				
54/74AHCT138	3-Line to 8-Line Decoders/	24	20	160	80
54/74AHCT139	Dual 1-of-4 Decoders/Multiplexers	20	17	160	80
54/74AHCT148	8-Line 3-Line Priority Encoders	20	17	160	80
54/74AHCT155	Dual 2-4 Line Decoders/Multiplexers	22	18	160	80
54/74AHCT157	Quad 2-Line to 1-Line Data Selectors/Multiplexers	14	11	160	80
54/74AHCT158	Quad 2-Line to 1-Line Data Selectors/Multiplexers	14	11	160	80
54/74AHCT161	Synchronous 4-Bit Binary Counters	19	16	160	80
54/74AHCT163	Synchronous 4-Bit Binary Counters	20	16	160	80
54/74AHCT164	8-Bit Serial-In/Parallel-Out Shift Registers	24	20	160	80
54/74AHCT165	8-Bit Parallel-In/Serial-Out Registers	30	25	160	80
54/74AHCT166	8-Bit Parallel-In/Serial-Out Shift Registers with Clear	20	17	160	80
54/74AHCT173	4-Bit D-Type Registers with 3-State Outputs	25	21	160	80
54/74AHCT174	Hex D-Type Flip-Flops with Clear	19	16	160	80
54/74AHCT175	Quad D-Type Flip-Flops with Clear	19	16	160	80
54/74AHCT191	Synchronous 4-Bit Up/Down Binary Counters	30	25	160	80
54/74AHCT193	Synchronous 4-Bit Up/Down Binary Counters with Dual Clock	23	19	160	80
54/74AHCT240	Octal Buffers and Line Drivers with 3-State Outputs	12	10	160	80
54/74AHCT241	Octal Buffers and Line Drivers with 3-State Outputs	12	10	160	80
54/74AHCT244	Octal Buffers and Line Drivers with 3-State Outputs	12	10	160	80
54/74AHCT245	Octal Bus Transceivers with 3-State Outputs	14	10	160	80
54/74AHCT257	Quad 2-Line to 1-Line Data Selectors/Multiplexers with 3-State Outputs	12	10	160	80
54/74AHCT258	Quad 2-Line to-Line Data Selectors/Multiplexers with 3-State Outputs	12	10	160	80
54/74AHCT259	8-Bit Addressable Latches	24	20	160	80
54/74AHCT266	Quad Exclusive -NOR Gates with Open-Drain Outputs	37	31	40	20
54/74AHCT273	Octal D-Type Flip-Flops with Clear	17	14	160	80
54/74AHCT299	8-Bit Universal Shift/Storage Registers with 3-State Outputs	20	17	160	80
54/74AHCT365	Hex Bus-Drivers with 3-State Outputs	14	12	160	80
54/74AHCT366	Hex Bus-Drivers with 3-State Outputs	12	10	160	80
54/74AHCT367	Hex Bus-Drivers with 3-State Outputs	14	12	160	80
54/74AHCT368	Hex Bus-Drivers with 3-State Outputs	12	10	160	80
54/74AHCT373	Octal D-Type Transparent Latches with 3-State Outputs	17	14	160	80
54/74AHCT374	Octal D-Type Flip-Flops with 3-State Outputs	17	14	160	80
54/74AHCT393	Dual 4-Bit Binary Counters	16	13	160	80
54/74AHCT399	Quad 2-Port Registers	23	19	160	80
54/74AHCT423	Dual Retriggerable Monostable Multivibrators				
54/74AHCT533	Octal D-Type Transparent Latches with 3-State Outputs	19	16	160	80
54/74AHCT534	Octal D-Type Transparent Flip-Flops with 3-State Outputs	17	14	160	80
54/74AHCT540	Octal Buffers and Line Drivers with 3-State Outputs	12	10	160	80
54/74AHCT541	Octal Buffers and Line Drivers with 3-State Outputs	12	10	160	80
54/74AHCT563	Octal D-TypeTransparent Latches with 3-State Outputs	17	14	160	80
54/74AHCT564	Octal D-Type Flip-Flops with 3-State Outputs	17	14	160	80
54/74AHCT573	Octal D-Type Transparent Latches with 3-State Outputs	17	14	160	80
54/74AHCT574	Octal D-Type Flip-Flops with 3-State Outputs	17	14	160	80
54/74AHCT590	8-Bit Binary Counters with 3-State Output Register				
54/74AHCT592	8-Bit Binary Counters with Input Register				
54/74AHCT593	8-Bit Binary Counters with Bidirectional Input Register/Counter Output				
54/74AHCT640	Octal Bus Transceivers	14	11	160	80
54/74AHCT643	Octal Bus Transceivers	14	11	160	80
54/74AHCT646	Octal 3-State Bus Transceivers with Registers	18	11	160	80
54/74AHCT648	Octal 3-State Bus Transceivers with Registers	18	11	160	80

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HIGH-SPEED CMOS LOGIC PRODUCTS

Part Number	Description
25C02	8 Bit TTL Successive Approximation Register (Direct Plug In Replacements for the AM2502 and DM2502, TTL Successive Approximation Registers)
25C03	8 Bit TTL Successive Approximation Register (Direct Plug In Replacement for the AM2503 and DM2503, TTL Successive Approximation Registers)
25C04	12 Bit TTL Successive Approximation Register (Direct Plug In Replacement for the AM2504 and DM2504, TTL Successive Approximation Registers)
29C01	4 Bit CMOS Microprocessor Slice (Pin for Pin Replacement for the Bipolar 2901)
29C09 A/B	CMOS Microprogram Sequencer (Pin for Pin Replacement for the Bipolar 2909, A Version meets Bipolar 2909 A speeds, B version improves speed 20%)
29C10	CMOS Microprogram Controller (Pin for Pin Replacement for the Bipolar 2910)
29C11 A/B	CMOS Microprogram Sequencer (Pin for Pin Replacement for the Bipolar 2911, A Version meets Bipolar 2911 A speeds, B version improves speed 20%)

ADDITIONAL PRODUCTS

Ideal Semiconductor Part Number	Description
D89404	HAL16C1
D89405	HAL12H6
D89406	HAL14H4
D89407	HAL10H8
D89408	HAL16L2
D89409	HAL14L4
D89410	HAL12L6
D89411	HAL10L8
D89412	HAL16H2
D89413	HAL16L8
D89414	27LS00 256 x 1 Static RAM
D89415	4116 16K x 1 Dynamic RAM
C3403	Quad Low Power of Amplifier
E5034	High Speed 8-Bit A/D Converter
E5045	7 Channel Decoder
E5060	Hi Speed Precision
E5150	LIN Triple 4-Bit Video DAC-MEM
E5151	Triple 4-Bit Video DAC
E5152	LIN Triple 4-Bit DAC-MEM-TTL
E530	LIN High Slew OP Amplifier
E5520	LIN LVDT Signal Conditioning CKT
E5535	LIN Dual High Slew OP Amplifier
E565	LIN Phase Locked Loop
G3526	Switched-mode power supply control circuits
38	High slew rate operational amplifier
44	Servo amplifier
89	LED decoder/driver
CB2675	CRT, color/monochrome attributes controller
CB2677	CRT, video attributes controller

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ADVANCE INFORMATION

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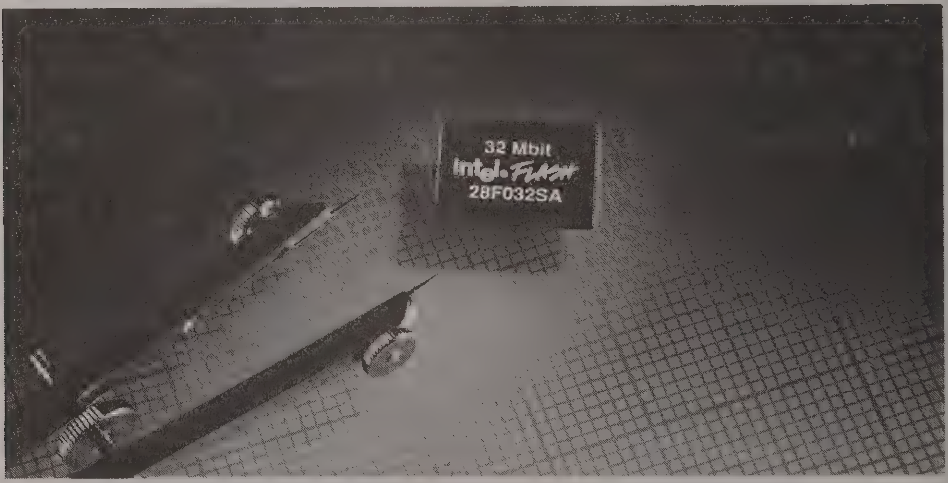
DD28F032SA
32-MBIT (2 MBIT x 16, 4 MBIT x 8) FLASHFILE™ MEMORY

- **User-Selectable 3.3V or 5V V_{CC}**
- **User-Configurable x8 or x16 Operation**
- **70 ns Maximum Access Time**
- **0.43 MB/sec Write Transfer Rate**
- **1 Million Erase Cycles per Block**
- **56-Lead, 1.2 x 14 x 20mm Dual Die Advanced TSOP Package Technology**
- **Revolutionary Architecture**
  - **100% Backwards Compatible with Intel 28F016SA**
  - **Pipelined Command Execution**
  - **Write during Erase**
- **2 mA Typical I_{CC} in Static Mode**
- **2 μA Typical Deep Power-Down**
- **64 Independently Lockable Blocks**
- **State-of-the-Art 0.6 μm ETOX™ IV Flash Technology**

Intel's DD28F032SA 32-Mbit FlashFile™ Memory is a revolutionary architecture which enables the design of truly mobile, high performance, personal computing and communication products. With innovative capabilities, low power operation and very high read/write performance, the DD28F032SA is also the ideal choice for designing embedded mass storage flash memory systems.

The DD28F032SA is the result of highly advanced packaging innovation which encapsulates two 28F016SA die in a single Dual Die Thin Small Outline Package (DDTSOP).

The DD28F032SA is the highest density, highest performance non-volatile read/write solution for solid-state storage applications. Its symmetrically blocked architecture (100% compatible with the 28F016SA 16-Mbit FlashFile memory), very high cycling, low power 3.3V operation, very fast write and read performance and selective block locking provide a highly flexible memory component suitable for high density memory cards, Resident Flash Arrays and PCMCIA-ATA Flash Drives. The DD28F032SA's dual read voltage enables the design of memory cards which can interchangeably be read/written in 3.3V and 5.0V systems. Its x8/x16 architecture allows the optimization of memory to processor interface. The flexible block locking option enables bundling of executable application software in a Resident Flash Array or memory card. The DD28F032SA will be manufactured on Intel's 0.6 μm ETOX™ IV technology.



290490–2

Figure 1

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October 1993 Order Number: 290490-001

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ADVANCE INFORMATION

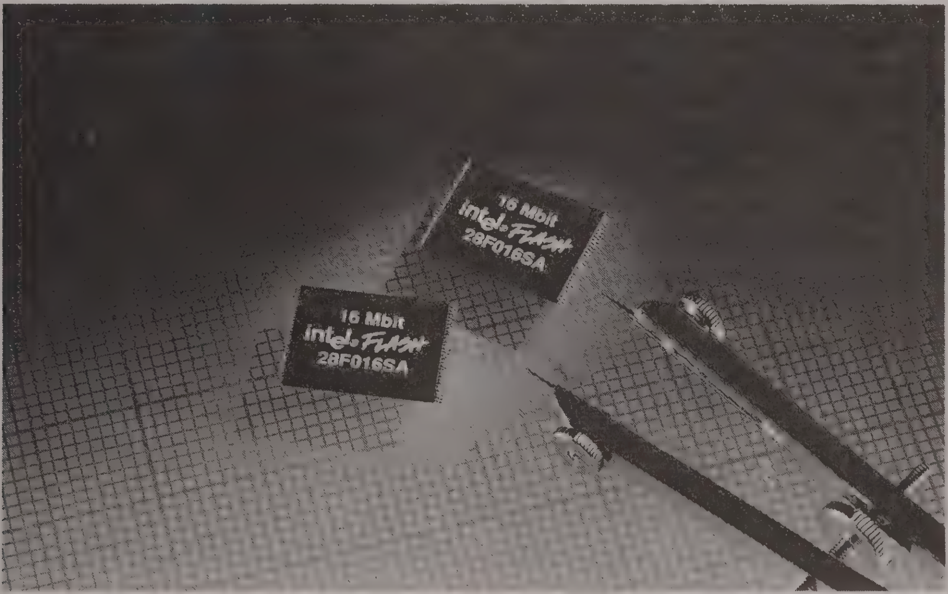
28F016SA
16 MBIT (1 MBIT x 16, 2 MBIT x 8) FLASHFILE™ MEMORY

- **User-Selectable 3.3V or 5V V_{CC}**
- **User-Configurable x8 or x16 Operation**
- **70 ns Maximum Access Time**
- **0.43 MB/sec Write Transfer Rate**
- **1 Million Erase Cycles per Block**
- **56-Lead, 1.2mm x 14mm x 20mm TSOP Package**
- **Revolutionary Architecture**
  - **Pipelined Command Execution**
  - **Write During Erase**
  - **Command Superset of Intel 28F008SA**
- **1 mA Typical I_{CC} in Static Mode**
- **1 μA Typical Deep Power-Down**
- **32 Independently Lockable Blocks**
- **State-of-the-Art 0.6 μm ETOX™ IV Flash Technology**

Intel's 28F016SA 16-Mbit FlashFile™ Memory is a revolutionary architecture which enables the design of truly mobile, high performance, personal computing and communication products. With innovative capabilities, low power operation and very high read/write performance, the 28F016SA is also the ideal choice for designing embedded mass storage flash memory systems.

The 28F016SA is a very high density, highest performance non-volatile read/write solution for solid-state storage applications. Its symmetrically blocked architecture (100% compatible with the 28F008SA 8-Mbit FlashFile™ memory), extended cycling, low power 3.3V operation, very fast write and read performance and selective block locking provide a highly flexible memory component suitable for high density memory cards, Resident Flash Arrays and PCMCIA-ATA Flash Drives. The 28F016SA's dual read voltage enables the design of memory cards which can interchangeably be read/written in 3.3V and 5.0V systems. Its x8/x16 architecture allows the optimization of memory to processor interface. The flexible block locking option enables bundling of executable application software in a Resident Flash Array or memory card. Manufactured on Intel's 0.6 μm ETOX™IV process technology, the 28F016SA is the most cost-effective, high-density 3.3V flashfile memory.

Intel



290489–1

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28F008SA
8-MBIT (1-MBIT x 8) FLASH MEMORY

- **High-Density Symmetrically Blocked Architecture**
  - **Sixteen 64-Kbyte Blocks**
- **Extended Cycling Capability**
  - **100,000 Block Erase Cycles**
  - **1.6 Million Block Erase Cycles per Chip**
- **Automated Byte Write and Block Erase**
  - **Command User Interface**
  - **Status Register**
- **System Performance Enhancements**
  - **RY/BY# Status Output**
  - **Erase Suspend Capability**
- **Deep-Powerdown Mode**
  - **0.20 μA I_{CC} Typical**
- **Very High-Performance Read**
  - **85 ns Maximum Access Time**
- **SRAM-Compatible Write Interface**
- **Hardware Data Protection Feature**
  - **Erase/Write Lockout during Power Transitions**
- **Industry Standard Packaging**
  - **40-Lead TSOP, 44-Lead PSOP**
- **ETOX III Nonvolatile Flash Technology**
  - **12V Byte Write/Block Erase**
- **Independent Software Vendor Support**
  - **Microsoft* Flash File System (FFS)**

Intel's 28F008SA 8-Mbit FlashFile™ Memory is the highest density nonvolatile read/write solution for solid state storage. The 28F008SA's extended cycling, symmetrically blocked architecture, fast access time, write automation and low power consumption provide a more reliable, lower power, lighter weight and higher performance alternative to traditional rotating disk technology. The 28F008SA brings new capabilities to portable computing. Application and operating system software stored in resident flash memory arrays provide instant-on, rapid execute-in-place and protection from obsolescence through in-system software updates. Resident software also extends system battery life and increases reliability by reducing disk drive accesses.

For high density data acquisition applications, the 28F008SA offers a more cost-effective and reliable alternative to SRAM and battery. Traditional high density embedded applications, such as telecommunications, can take advantage of the 28F008SA's nonvolatility, blocking and minimal system code requirements for flexible firmware and modular software designs.

The 28F008SA is offered in 40-lead TSOP (standard and reverse) and 44-lead PSOP packages. Pin assignments simplify board layout when integrating multiple devices in a flash memory array or subsystem. This device uses an integrated Command User Interface and state machine for simplified block erasure and byte write. The 28F008SA memory map consists of 16 separately erasable 64-Kbyte blocks.

Intel's 28F008SA employs advanced CMOS circuitry for systems requiring low power consumption and noise immunity. Its 85 ns access time provides superior performance when compared with magnetic storage media. A deep powerdown mode lowers power consumption to 1 μW typical thru V_{CC}, crucial in portable computing, handheld instrumentation and other low-power applications. The RP# power control input also provides absolute data protection during system powerup/down.

Manufactured on Intel's 0.8 micron ETOX process, the 28F008SA provides the highest levels of quality, reliability and cost-effectiveness.

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October 1993 **Order Number: 290429-004**

ADVANCE INFORMATION

28F400BX-T/B, 28F004BX-T/B
4 MBIT (256K x16, 512K x8) BOOT BLOCK FLASH MEMORY FAMILY

- x8/x16 Input/Output Architecture
  - 28F400BX-T, 28F400BX-B
  - For High Performance and High Integration 16-bit and 32-bit CPUs
- x8-only Input/Output Architecture
  - 28F004BX-T, 28F004BX-B
  - For Space Constrained 8-bit Applications
- Optimized High Density Blocked Architecture
  - One 16-KB Protected Boot Block
  - Two 8-KB Parameter Blocks
  - One 96-KB Main Block
  - Three 128-KB Main Blocks
  - Top or Bottom Boot Locations
- Extended Cycling Capability
  - 100,000 Block Erase Cycles
- Automated Word/Byte Write and Block Erase
  - Command User Interface
  - Status Registers
  - Erase Suspend Capability
- SRAM-Compatible Write Interface
- Automatic Power Savings Feature
  - 1 mA Typical I_{CC} Active Current in Static Operation
- Very High-Performance Read
  - 60/80 ns Maximum Access Time
  - 30/40 ns Maximum Output Enable Time
- Low Power Consumption
  - 20 mA Typical x8 Active Read Current
  - 25 mA Typical x16 Active Read Current
- Reset/Deep Power-Down Input
  - 0.2 µA I_{CC} Typical
  - Acts as Reset for Boot Operations
- Extended Temperature Operation
  - −40°C to +85°C
- Write Protection for Boot Block
- Hardware Data Protection Feature
  - Erase/Write Lockout During Power Transitions
- Industry Standard Surface Mount Packaging
  - 28F400BX: JEDEC ROM Compatible
    44-Lead PSOP
    56-Lead TSOP
  - 28F004BX: 40-Lead TSOP
- 12V Word/Byte Write and Block Erase
  - V_{PP} = 12V ±5% Standard
  - V_{PP} = 12V ±10% Option
- ETOX III Flash Technology
  - 5V Read

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October 1993
Order Number: 290451-003

ADVANCE INFORMATION

28F200BX-T/B, 28F002BX-T/B
2-MBIT (128K x 16, 256K x 8) BOOT BLOCK FLASH MEMORY FAMILY

- x8/x16 Input/Output Architecture
  - 28F200BX-T, 28F200BX-B
  - For High Performance and High Integration 16-bit and 32-bit CPUs
- x8-only Input/Output Architecture
  - 28F002BX-T 28F002BX-B
  - For Space Constrained 8-bit Applications
- Optimized High Density Blocked Architecture
  - One 16-KB Protected Boot Block
  - Two 8-KB Parameter Blocks
  - One 96-KB Main Block
  - One 128 KB Main Block
  - Top or Bottom Boot Locations
- Extended Cycling Capability
  - 100,000 Block Erase Cycles
- Automated Word/Byte Write and Block Erase
  - Command User Interface
  - Status Registers
  - Erase Suspend Capability
- SRAM-Compatible Write Interface
- Automatic Power Savings Feature
  - 1 mA Typical I_{CC} Active Current in Static Operation
- Hardware Data Protection Feature
  - Erase/Write Lockout during Power Transitions
- Very High-Performance Read
  - 60/80 ns Maximum Access Time
  - 30/40 ns Maximum Output Enable Time
- Low Power Consumption
  - 20 mA Typical x8 Active Read Current
  - 25 mA Typical x16 Active Read Current
- Reset/Deep Power-Down Input
  - 0.2 μA I_{CC} Typical
  - Acts as Reset for Boot Operations
- Extended Temperature Operation
  - −40°C to +85°C
- Write Protection for Boot Block
- Industry Standard Surface Mount Packaging
  - 28F200BX: JEDEC ROM Compatible
    44-Lead PSOP
    56-Lead TSOP
  - 28F002BX: 40-Lead TSOP
- 12V Word/Byte Write and Block Erase
  - V_{PP} = 12V ±5% Standard
  - V_{PP} = 12V ±10% Option
- ETOX III Flash Technology
  - 5V Read
- Independent Software Vendor Support

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October 1993 Order Number: 290448-003

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28F001BX-T/28F001BX-B
1M (128K x 8) CMOS FLASH MEMORY

- **High Integration Blocked Architecture**
  - **One 8 KB Boot Block w/Lock Out**
  - **Two 4 KB Parameter Blocks**
  - **One 112 KB Main Block**
- **100,000 Erase/Program Cycles Per Block**
- **Simplified Program and Erase**
  - **Automated Algorithms via On-Chip Write State Machine (WSM)**
- **SRAM-Compatible Write Interface**
- **Deep-Powerdown Mode**
  - **0.05 μA I_{CC} Typical**
  - **0.8 μA I_{PP} Typical**
- **12.0V ±5% V_{PP}**
- **High-Performance Read**
  - **120 ns Maximum Access Time**
  - **5.0V ±10% V_{CC}**
- **Hardware Data Protection Feature**
  - **Erase/Write Lockout during Power Transitions**
- **Advanced Packaging, JEDEC Pinouts**
  - **32-Pin PDIP**
  - **32-Lead PLCC, TSOP**
- **ETOX II Nonvolatile Flash Technology**
  - **EPROM-Compatible Process Base**
  - **High-Volume Manufacturing Experience**
- **Extended Temperature Options**

Intel's 28F001BX-B and 28F001BX-T combine the cost-effectiveness of Intel standard flash memory with features that simplify write and allow block erase. These devices aid the system designer by combining the functions of several components into one, making boot block flash an innovative alternative to EPROM and EEPROM or battery-backed static RAM. Many new and existing designs can take advantage of the 28F001BX's integration of blocked architecture, automated electrical reprogramming, and standard processor interface.

The 28F001BX-B and 28F001BX-T are 1,048,576 bit nonvolatile memories organized as 131,072 bytes of 8 bits. They are offered in 32-pin plastic DIP, 32-lead PLCC and 32-lead TSOP packages. Pin assignment conform to JEDEC standards for byte-wide EPROMs. These devices use an integrated command port and state machine for simplified block erasure and byte reprogramming. The 28F001BX-T's block locations provide compatibility with microprocessors and microcontrollers that boot from high memory, such as Intel's MCS-186 family, 80286, i386™, i486™, i860™ and 80960CA. With exactly the same memory segmentation, the 28F001BX-B memory map is tailored for microprocessors and microcontrollers that boot from low memory, such as Intel's MCS-51, MCS-196, 80960KX and 80960SX families. All other features are identical, and unless otherwise noted, the term 28F001BX can refer to either device throughout the remainder of this document.

The boot block section includes a reprogramming write lock out feature to guarantee data integrity. It is designed to contain secure code which will bring up the system minimally and download code to the other locations of the 28F001BX. Intel's 28F001BX employs advanced CMOS circuitry for systems requiring high-performance access speeds, low power consumption, and immunity to noise. Its 120 ns access time provides no-WAIT-state performance for a wide range of microprocessors and microcontrollers. A deep-powerdown mode lowers power consumption to 0.25 μW typical through V_{CC}, crucial in laptop computer, handheld instrumentation and other low-power applications. The RP# power control input also provides absolute data protection during system powerup or power loss.

Manufactured on Intel's ETOX process base, the 28F001BX builds on years of EPROM experience to yield the highest levels of quality, reliability, and cost-effectiveness.

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Order Number: 290406-005
October 1993

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28F020

2048K (256K x 8) CMOS FLASH MEMORY

- **Flash Electrical Chip-Erase**
  - **2 Second Typical Chip-Erase**
- **Quick-Pulse Programming Algorithm**
  - **10 μs Typical Byte-Program**
  - **4 Second Chip-Program**
- **100,000 Erase/Program Cycles**
- **12.0V ±5% V_{PP}**
- **High-Performance Read**
  - **70 ns Maximum Access Time**
- **CMOS Low Power Consumption**
  - **10 mA Typical Active Current**
  - **50 μA Typical Standby Current**
  - **0 Watts Data Retention Power**
- **Integrated Program/Erase Stop Timer**
- **Command Register Architecture for Microprocessor/Microcontroller Compatible Write Interface**
- **Noise Immunity Features**
  - **±10% V_{CC} Tolerance**
  - **Maximum Latch-Up Immunity through EPI Processing**
- **ETOX Nonvolatile Flash Technology**
  - **EPROM-Compatible Process Base**
  - **High-Volume Manufacturing Experience**
- **JEDEC-Standard Pinouts**
  - **32-Pin Plastic Dip**
  - **32-Lead PLCC**
  - **32-Lead TSOP**

  (See Packaging Spec., Order #231369)
- **Extended Temperature Options**

Intel's 28F020 CMOS flash memory offers the most cost-effective and reliable alternative for read/write random access nonvolatile memory. The 28F020 adds electrical chip-erasure and reprogramming to familiar EPROM technology. Memory contents can be rewritten: in a test socket; in a PROM-programmer socket; on-board during subassembly test; in-system during final test; and in-system after-sale. The 28F020 increases memory flexibility, while contributing to time-and cost-savings.

The 28F020 is a 2048-kilobit nonvolatile memory organized as 262,144 bytes of 8 bits. Intel's 28F020 is offered in 32-pin plastic DIP, 32-lead PLCC, and 32-lead TSOP packages. Pin assignments conform to JEDEC standards for byte-wide EPROMs.

Extended erase and program cycling capability is designed into Intel's ETOX (EPROM Tunnel Oxide) process technology. Advanced oxide processing, an optimized tunneling structure, and lower electric field combine to extend reliable cycling beyond that of traditional EEPROMs. With the 12.0V V_{PP} supply, the 28F020 performs 100,000 erase and program cycles well within the time limits of the Quick-Pulse Programming and Quick-Erase algorithms.

Intel's 28F020 employs advanced CMOS circuitry for systems requiring high-performance access speeds, low power consumption, and immunity to noise. Its 70 nanosecond access time provides no-WAIT-state performance for a wide range of microprocessors and microcontrollers. Maximum standby current of 100 μA translates into power savings when the device is deselected. Finally, the highest degree of latch-up protection is achieved through Intel's unique EPI processing. Prevention of latch-up is provided for stresses up to 100 mA on address and data pins, from −1V to V_{CC} + 1V.

With Intel's ETOX process base, the 28F020 levers years of EPROM experience to yield the highest levels of quality, reliability, and cost-effectiveness.

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October 1993 **Order Number: 290245-006**

28F010
1024K (128K x 8) CMOS FLASH MEMORY

- **Flash Electrical Chip-Erase**
  - **1 Second Typical Chip-Erase**
- **Quick Pulse Programming Algorithm**
  - **10 μs Typical Byte-Program**
  - **2 Second Chip-Program**
- **100,000 Erase/Program Cycles**
- **12.0V ±5% V_{PP}**
- **High-Performance Read**
  - **65 ns Maximum Access Time**
- **CMOS Low Power Consumption**
  - **10 mA Typical Active Current**
  - **50 μA Typical Standby Current**
  - **0 Watts Data Retention Power**
- **Integrated Program/Erase Stop Timer**
- **Command Register Architecture for Microprocessor/Microcontroller Compatible Write Interface**
- **Noise Immunity Features**
  - **±10% V_{CC} Tolerance**
  - **Maximum Latch-Up Immunity through EPI Processing**
- **ETOX Nonvolatile Flash Technology**
  - **EPROM-Compatible Process Base**
  - **High-Volume Manufacturing Experience**
- **JEDEC-Standard Pinouts**
  - **32-Pin Plastic Dip**
  - **32-Lead PLCC**
  - **32-Lead TSOP**

  (See Packaging Spec., Order #231369)
- **Extended Temperature Options**

Intel's 28F010 CMOS flash memory offers the most cost-effective and reliable alternative for read/write random access nonvolatile memory. The 28F010 adds electrical chip-erasure and reprogramming to familiar EPROM technology. Memory contents can be rewritten: in a test socket; in a PROM-programmer socket; on-board during subassembly test; in-system during final test; and in-system after-sale. The 28F010 increases memory flexibility, while contributing to time and cost savings.

The 28F010 is a 1024 kilobit nonvolatile memory organized as 131,072 bytes of 8 bits. Intel's 28F010 is offered in 32-pin plastic dip or 32-lead PLCC and TSOP packages. Pin assignments conform to JEDEC standards for byte-wide EPROMs.

Extended erase and program cycling capability is designed into Intel's ETOX (EPROM Tunnel Oxide) process technology. Advanced oxide processing, an optimized tunneling structure, and lower electric field combine to extend reliable cycling beyond that of traditional EEPROMs. With the 12.0V V_{PP} supply, the 28F010 performs 100,000 erase and program cycles well within the time limits of the Quick Pulse Programming and Quick Erase algorithms.

Intel's 28F010 employs advanced CMOS circuitry for systems requiring high-performance access speeds, low power consumption, and immunity to noise. Its 65 nanosecond access time provides no-WAIT-state performance for a wide range of microprocessors and microcontrollers. Maximum standby current of 100 μA translates into power savings when the device is deselected. Finally, the highest degree of latch-up protection is achieved through Intel's unique EPI processing. Prevention of latch-up is provided for stresses up to 100 mA on address and data pins, from −1V to V_{CC} + 1V.

With Intel's ETOX process base, the 28F010 levers years of EPROM experience to yield the highest levels of quality, reliability, and cost-effectiveness.

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October 1993 Order Number: 290207-009

SERIES 2+ FLASH MEMORY CARDS
40 MEGABYTES

IMC040FLSP

- **Single Power Supply Operation**
- **Automatically Reconfigures for 3.3V and 5V Systems**
- **200 ns Maximum Access Time with 10 MB/S Read Throughput**
- **High Performance Random Writes**
  - **—0.85 MB/S Sustained Throughput**
  - **—1 KB Burst Write @ 10 MB/S**
- **PCMCIA 2.0/JEIDA 4.1 Compatible**
- **PCMCIA Type 1 Form Factor**
- **Revolutionary Architecture**
  - **—Pipelined Command Execution**
  - **—Write During Erase**
  - **—Series 2 Command Superset**
- **50 μA Typical Deep PowerDown**
- **State-of-the-Art 0.6 μm ETOX IV Flash Technology**
- **1 Million Erase Cycles per Block**
- **640 Independent Lockable Blocks**

Intel's Series 2+ Flash Memory Card sets the new record for high-performance disk emulation and XIP applications in mobile PC's and dedicated equipment. Manufactured with Intel's DD28F032SA 32-Mbit FlashFile™ Memory, this card takes advantage of a revolutionary architecture that provides innovative capabilities, low power operation and very high read/write performance.

The Series 2+ Card provides today's highest density, highest performance non-volatile read/write solution for solid-state storage applications. These applications are further enhanced with this product's symmetrically blocked architecture, extended MTBF, low power 3.3V operation, built-in V_{PP} generator, and multiple block-locking methods. The Series 2+ Card's dual read and write voltages allow interchange between 3.3V and 5V systems.

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Order Number: 290512-001
October 1993

ADVANCE INFORMATION

SERIES 2+ FLASH MEMORY CARDS
4 and 20 Megabytes

iMC004FLSP, iMC020FLSP

- **Single Power Supply Operation**
- **Automatically Reconfigures for 3.3V and 5V Systems**
- **200 ns Maximum Access Time with 10 MB/S Read Throughout**
- **High Performance Random Writes**
  - **0.85 MB/S Sustained Throughout**
  - **1 KB Burst Write @ 10 MB/S**
- **PCMCIA 2.0/JEIDA 4.1 Compatible**
- **PCMCIA Type 1 Form Factor**
- **Revolutionary Architecture**
  - **Pipelined Command Execution**
  - **Write During Erase**
  - **Series 2 Command Superset**
- **12 μA Typical Deep Powerdown**
- **State-of-the Art 0.6 μm ETOX IV Flash Technology**
- **1 Million Erase Cycles per Block**
- **320 Independent Lockable Blocks**

Intel's Series 2+ Flash Memory Card sets the new record for high-performance disk emulation and XIP applications in mobile PC's and dedicated equipment. Manufactured with Intel's 28F016SA 16-Mbit FlashFile™ Memory, this card takes advantage of a revolutionary architecture that provides innovative capabilities, low power operation and very high read/write performance.

The Series 2+ Card provides today's highest density, highest performance non-volatile read/write solution for solid-state storage applications. These applications are further enhanced with this product's symmetrically blocked architecture, extended MTBF, low power 3.3V operation, built-in V_{PP} generator, and multiple block-locking methods. The Series 2+ Card's dual read and write voltages allow interchange between 3.3V and 5V systems.

intel
FLASH
Series 2+
4 MByte Memory Card
intel
FLASH
Series 2+
20 MByte Memory Card

290491–8

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October 1993 **Order Number: 290491-001**

intel. **PRELIMINARY**

SERIES 2 FLASH MEMORY CARDS
iMC002FLSA, iMC004FLSA, iMC010FLSA, iMC020FLSA

- **2, 4, 10 and 20 Megabyte Capacities**
- **PCMCIA 2.0/JEIDA 4.1 68-Pin Standard**
  - **Hardwired Card Information Structure**
  - **Byte- or Word-Wide Selectable**
- **Component Management Registers for Card Status/Control and Flexible System Interface**
- **Automatic Erase/Write**
  - **Monitored with Ready/Busy Output**
- **Card Power-Down Modes**
  - **Deep-Sleep for Low Power Applications**
- **Mechanical Write Protect Switch**
- **Solid-State Reliability**
- **Intel FlashFile™ Architecture**
- **High-Performance Read Access**
  - **200 ns Maximum**
- **High-Performance Random Writes**
  - **10 μs Typical Word Write**
- **Erase Suspend to Read Command**
  - **Keeps Erase as Background Task**
- **Nonvolatility (Zero Retention Power)**
  - **No Batteries Required for Back-up**
- **ETOX III 0.8μ Flash Memory Technology**
  - **5V Read, 12V Erase/Write**
  - **High-Volume Manufacturing Experience**

Intel's Series 2 Flash Memory Card facilitates high-performance disk emulation in mobile PCs and dedicated equipment. Manufactured with Intel's ETOX III 0.8μ, FlashFile Memory devices, the Series 2 Card allows code and data retention while erasing and/or writing other blocks. Additionally, the Series 2 Flash Memory Card features low power modes, flexible system interfacing and a 200 ns read access time. When coupled with Intel's low-power microprocessors, these cards enable high-performance implementations of mobile computers and systems.

Series 2 Cards conform to the Personal Computer Memory Card International Association (PCMCIA 2.01)/ Japanese Electronics Industry Development Association (JEIDA 4.1) 68-pin standard, providing electrical and physical compatibility.

Data file management software, such as Microsoft's* Flash File System (FFS), provide data file storage and memory management, much like a disk operating system. Intel's Series 2 Flash Memory Cards, coupled with flash file management software, effectively provide a removable, all-silicon mass storage solution with higher performance and reliability than disk-based memory architectures.

Designing with Intel's FlashFile Architecture enables OEM system manufacturers to design and manufacture a new generation of mobile PCs and dedicated equipment where high performance, ruggedness, long battery life and lighter weight are a requirement. For large user groups in workstation environments, the Series 2 Cards provide a means to securely store user data and backup system configuration/status information.

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October 1993 Order Number: 290434-003

iMC004FLKA
4-MBYTE FLASH MEMORY CARD

- **Inherent Nonvolatility (Zero Retention Power)**
  - **No Batteries Required for Back-up**
- **High-Performance Read**
  - **200 ns Maximum Access Time**
- **CMOS Low Power Consumption**
  - **40 mA Typical Active Current (X8)**
  - **800 μA Typical Standby Current**
- **Flash Electrical Zone-Erase**
  - **2 Seconds Typical per 256 Kbyte Zone**
  - **Multiple Zone-Erase**
- **Random Writes to Erased Zones**
  - **10 μs Typical Byte Write**
- **Write Protect Switch to Prevent Accidental Data Loss**
- **Command Register Architecture for Microprocesssor/Microcontroller Compatible Write Interface**
- **ETOX II Flash Memory Technology**
  - **5V Read, 12V Erase/Write**
  - **High-Volume Manufacturing Experience**
- **PCMCIA/JEIDA 68-Pin Standard**
  - **Byte- or Word-wide Selectable**
- **Independent Software & Hardware Vendor Support**
  - **Integrated System Solution Using Flash Filing Systems**

Intel's iMC004FLKA Flash Memory Card is the removable solution for storing and transporting important user data and application code. The combination of rewritability and nonvolatility make the Intel Flash Memory Card ideal for data acquisition and updatable firmware applications. Designing with Intel's Flash Memory Card enables OEM system manufacturers to produce portable and dedicated function systems that are higher performance, more rugged, and consume less power.

The iMC004FLKA conforms to the PCMCIA1.0 international standard, providing standardization at the hardware and data interchange level. OEMs may opt to write the Card Information Structure (CIS) at the memory card's address 00000H with a format utility. This information provides data interchange functional capability. The 200 ns access time allows for "execute-in-place" capability, for popular low-power microprocessors. Intel's 4-MByte Flash Memory Card operates in a byte-wide and word-wide configuration providing performance/power options for different systems.

Intel's Flash Memory card employs Intel's ETOX II Flash Memories. Filing systems, such as Microsoft's* Flash File System (FFS), facilitate data file storage and card erasure using a purely nonvolatile medium in the DOS environment. Flash filing systems, coupled with the Intel Flash Memory Card, effectively create an all-silicon nonvolatile read/write random access memory system that is more reliable and higher performance than disk-based memory systems.

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Order Number: 290388-004
October 1993

iMC002FLKA
2-MBYTE FLASH MEMORY CARD

- **Inherent Nonvolatility (Zero Retention Power)**
  - **No Batteries Required for Back-up**
- **High-Performance Read**
  - **200 ns Maximum Access Time**
- **CMOS Low Power Consumption**
  - **25 mA Typical Active Current (X8)**
  - **400 μA Typical Standby Current**
- **Flash Electrical Zone-Erase**
  - **2 Seconds Typical per 256 Kbyte Zone**
  - **Multiple Zone-Erase**
- **Random Writes to Erased Zones**
  - **10 μs Typical Byte Write**
- **Write Protect Switch to Prevent Accidental Data Loss**
- **Command Register Architecture for Microprocesssor/Microcontroller Compatible Write Interface**
- **ETOX II Flash Memory Technology**
  - **5V Read, 12V Erase/Write**
  - **High-Volume Manufacturing Experience**
- **PCMCIA/JEIDA 68-Pin Standard**
  - **Byte- or Word-wide Selectable**
- **Independent Software & Hardware Vendor Support**
  - **Integrated System Solution Using Flash Filing Systems**

Intel's iMC002FLKA Flash Memory Card is the removable solution for storing and transporting important user data and application code. The combination of rewritability and nonvolatility make the Intel Flash Memory Card ideal for data acquisition and updatable firmware applications. Designing with Intel's Flash Memory Card enables OEM system manufacturers to produce portable and dedicated function systems that are higher performance, more rugged, and consume less power.

The iMC002FLKA conforms to the PCMCIA 1.0 international standard, providing standardization at the hardware and data interchange level. OEMs may opt to write the Card Information Structure (CIS) at the memory card's address 00000H with a format utility. This information provides data interchange functional capability. The 200 ns access time allows for "execute-in-place" capability, for popular low-power microprocessors. Intel's 2-MByte Flash Memory Card operates in a byte-wide and word-wide configuration providing performance/power options for different systems.

Intel's Flash Memory card employs Intel's ETOX II Flash Memories. Filing systems, such as Microsoft's* Flash File System (FFS), facilitate data file storage and card erasure using a purely nonvolatile medium in the DOS environment. Flash filing systems, coupled with the Intel Flash Memory Card, effectively create an all-silicon nonvolatile read/write random access memory system that is more reliable and higher performance than disk-based memory systems.

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iMC001FLKA
1-MBYTE FLASH MEMORY CARD

- **Inherent Nonvolatility (Zero Retention Power)**
  - **No Batteries Required for Back-Up**
- **High-Performance Read**
  - **200 ns Maximum Access Time**
- **CMOS Low Power Consumption**
  - **25 mA Typical Active Current (X8)**
  - **400 μA Typical Standby Current**
- **Flash Electrical Zone-Erase**
  - **1 Second Typical per 128 Kbyte Zone**
  - **Multiple Zone Erase > 128 KB/s**
- **Random Writes to Erased Zones**
  - **10 μs Typical Byte Write**
- **Write Protect Switch to Prevent Accidental Data Loss**
- **Command Register Architecture for Microprocessor/Microcontroller Compatible Write Interface**
- **ETOX II Flash Memory Technology**
  - **5V Read, 12V Erase/Write**
  - **High-Volume Manufacturing Experience**
- **PCMCIA/JEIDA 68-Pin Standard**
  - **Byte- or Word-Wide Selectable**
- **Independent Software & Hardware Vendor Support**
  - **Integrated System Solution Using Flash Filing Systems**

Intel's iMC001FLKA Flash Memory Card is the removable solution for storing and transporting important user data and application code. The combination of rewritability and nonvolatility make the Intel Flash Memory Card ideal for data acquisition and updatable firmware applications. Designing with Intel's Flash Memory Card enables OEM system manufacturers to produce portable and dedicated function systems that are higher performance, more rugged, and consume less power.

The iMC001FLKA conforms to the PCMCIA 1.0 international standard, providing compatibility at the hardware and data interchange level. OEMs may opt to write the Card Information Structure (CIS) at the memory card's address 00000H with a format utility. This information provides data interchange functional compatibility. The 200 ns access time allows for "execute-in-place" capability, for popular low-power microprocessors. Intel's 1-Mbyte Flash Memory Card operates in a byte-wide and word-wide configuration providing performance/power options for different systems.

Intel's Flash Memory card employs Intel's ETOX II Flash Memories. Filing systems, such as Microsoft's* Flash File System (FFS), facilitate data file storage and card erasure using a purely nonvolatile medium in the DOS environment. Flash filing systems, coupled with the Intel Flash Memory Card, effectively create an all-silicon nonvolatile read/write random access memory system that is more reliable and higher performance than disk-based memory systems.

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October 1993

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Flash Drive
iFD005P2SA/iFD010P2SA

- PCMCIA-ATA Type-2 PC Card
- 10 mW Idle, Standby, and Sleep Power
- 5 MB/s Interface Transfer Rate
- 1000G Shock
- Four PCMCIA-ATA Modes
- IDE-ATA Mode
- Absolutely Silent
- Compatible with Standard Data Compression Utilities
- 5 and 10-Mbyte versions
- Embedded Flash Memory Cycle Management
- Weighs only 1 oz. (29 gms)
- Nonvolatile; No Batteries Required
- Single +5 Volt Supply
- 32-Kbyte Buffer
- Uses FlashFile™ Architecture ETOX™ III 0.8μ Flash Memory Technology

intel.
FLASH
ATA
5 MB
PCMCIA ATA IDE
intel.
FLASH
ATA
10 MB
PCMCIA ATA IDE

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08007 Barcelona, Spain
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FAX 011 343 318 9339

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Computer Press
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S-85124 Sundsvall, Sweden
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Telex (854) 71355
FAX 46 60 151413

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Stolz Electronics AG
Taefernstrasse 11
CH5405 Baden-Daettwil,
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Phone 41 56 849000
FAX 41 56 849174

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The Krueger Company

1544 W. Mineral Rd. Tempe, AZ 85283 (800) 245-2235 (602) 820-5330 FAX (602) 820-1707

THE COMPANY

The **Krueger Company** combines 19 years of experience, a 20,000 square foot facility, and a reputation for quality that has made "Kruegerized" an industry standard for excellence in component conditioning. Krueger offers a number of opportunities to its customers, which include the following services and products:

THE SERVICES

- **Component Retrieval**. Krueger's patented infrared process can reliably remove most components from PC boards without degradation of the component.Thermal stress is absorbed primarily by the board . The rate of internal temperature change of an IC on the board is less than 1° C per second, well within Mil Spec. This service is ideal for companies that redesign their boards but have in-process inventory with expensive or scarce components soldered onto them or whose boards were accidentally stuffed with incorrect parts which are of more value than the boards. It also provides a way for a company to obtain value from parts on obsolete boards by enabling the sale of the components as part of a reclamation program.

- **Component Conditioning**. Krueger's skilled personnel and proprietary procedures provide a reusable product with leads that have been deoxidized, retinned, and straightened to conform to original manufacturer specs. UV windows are cleaned and UV erasable parts are erased. This service is ideal for eliminating contact problems on parts with older date codes (whether new or retrieved) and for preparing desocketed parts for reuse.

- **DRAM Testing and EPROM Programming**. Krueger offers a testing service for DRAMs and EPROMs as well as an EPROM programming service.

- **Microprocessor Testing**. Krueger offers functional test capability for 80386, 80486, and 68030 microprocessors in PGA packages as well as 68881 or 68882 FPUs.

- **Part Location**. As a result of an extensive network developed over 19 years in the component market, Krueger can locate many hard to find components and may be able to offer an assortment of ICs, discrete semiconductors, passive devices, and other components from surplus product inventories.

- **Reconditioned ICs**. Krueger is the source for low cost but reliable ICs that have been professionally reconditioned and are supported with an unconditional 30 day warranty. A typical example of parts likely to be available from Krueger in new or refurbished condition is listed on the following page.

Check with Krueger for any IC , current or obsolete, except for programmed parts that cannot be erased.

Phone : (800) 245-2235 or (602) 820-5330 **Fax : (602)820-1707**

..... the ATTRACTIVE ALTERNATIVE®

The Krueger Company

1544 W. Mineral Rd. Tempe, AZ 85283 (800) 245-2235 (602) 820-5330 FAX (602) 820-1707

THE PRODUCTS

Krueger offers a wide variety of ICs that have been fully conditioned as described above. Typical examples can be found in the *IC Master* listings. Krueger also offers thousands of parts that are not in the listings. Feel free to check with Krueger about your requirements at any time. Among the most popular ICs available from Krueger have been:

1. **DYNAMIC RAM**. Krueger can offer **DRAMs** ranging from 4K through 4M in capacity in all of the standard through hole, surface mount, and socketable packages. Among available **DRAMs** are the **4027, 4116, 4164, 41464, 41256, 511000, 514256, 514100, and 514400**. Also ask about 8 bit or 16 bit wide DRAMs, Page, Nibble, Static Column and Write Per Bit modes, and Multiport DRAMs such as the **41264** and other video RAMs.

2. **PSEUDOSTATIC RAM**. Krueger's **PSRAMs** are generally available in DIP and SOIC packages and include the **658512** (512Kx8), **658128** (128Kx8), and the **65256** (32Kx8) as well as lower capacities. These make great printer buffers.

3. **STATIC RAM**. Krueger offers **SRAMs** ranging from 1K (256 bit x 4 or 1K x 1) through 1M (128K x 8) in all of the popular through hole, socketable, and surface mount packages appropriate to the specific part. Typical parts include the **2114, 2125, 2128, 2147, 2148, 2149, 4801, 6116, 6167, 6168, 6264, 6287, 6288, 62256**, and **93422**. Ask also about Cache Data and Cache Tag SRAMs, FIFOs, and special purpose SRAMs such as the **48C02**.

4. **EPROM**. Krueger offers UV erasable **EPROMs** ranging from 2K through 4M in capacity. Higher capacity EPROMs are available in both the 8 bit and 16 bit width Typical examples include the **1702, 2708, 2716** (SV and TV), **2532, 2732, 2764, 68764, 68766, 27128, 27256, 27512, 27010, 27020, 27040, 27210, 27220, 27240,** and **27301** in DIP and, where applicable, CLCC packages. CMOS AND NMOS product is available for most appropriate parts. Ask also about Superfast EPROMs, Latched Address EPROMs, **EEPROMs**, **Flash** Memory and **EPLDs**.

5. **MICROPROCESSORS and CONTROLLERS**. Krueger offers most popular microprocessors, FPUs, and microcontrollers including the 65xx, 68xx, 68xxx (through **68040**), 68851, 68881, 68882, 80x86 (through **80486**), 8087, 80287, 80387, **Z8** and **Z80** series; the **687xx**, 803x-874x-875x series of microcontrollers, and many more. Ask about Digital Signal Processors, Graphics chips, Network chips, and other special purpose processors and coprocessors.

6. **SUPPORT CHIPS and PERIPHERAL CONTROLLERS**. Krueger offers most support chips and peripheral controllers at various levels of integration. Clock/Calendars (**146818** etc.), SCSI Controllers (**5380** etc.), Serial Ports/ACIAs (**8250, 16C450, 16C550** etc.), CRT Controllers (from the **6845** to the most recent SVGA controllers), FDCs (**179x, 765, 37C65**, and many more), and most 82xx and 82Cxxx series support chips and chipsets are generally available.

7. **DISPLAY DRIVERS**. LCD and Plasma Display Drivers (LCD**1600, 44100, 44780, 751506, 751508**, and more) are generally available.

8. **TELECOMMUNICATIONS**. Krueger also offers a variety of codecs, dialers, and other telecommunications chips.

. . . . the ATTRACTIVE ALTERNATIVE®

LANSDALE

SEMICONDUCTOR, INC.

2929 S. 48th St., Ste. 2
Tempe, AZ 85282
Phone: (602)438-0123
Fax: (602)438-0138

Lansdale Semiconductor, Inc., is an integrated circuit manufacturer specializing in diminished sourced military and commercial products. Lansdale is DESC certified for JAN Class B and can also supply MIL-STD-883 1.2.1 compliant, High Reliability military and commercial products.

Lansdale has purchased the rights to manufacture these products from the original manufacturers. IC's are fabricated in our own wafer foundry using the original masks, tooling and specifications. Lansdale truly "makes 'em like they used to".

The following is a partial cross-reference listing of Lansdale product available as of 10/1/93. It is organized by original manufacturer and shows the Lansdale replacement for each part listed. If there is a product you need but do not see on the list, contact Lansdale or your Lansdale Representative to determine if it has been recently acquired, has a Lansdale alternative, or can be specially manufactured for you.

AMD

Original P/N	Lansdale P/N
AM2501	AL2501
AM2506	AL2506
AM2905	AL2905
AM2906	AL2906
AM2915	AL2915
AM8T26	AL8T26

FAIRCHILD

Original P/N	Lansdale P/N
3262A	FL3262A
3262B	FL3262B
3341	FL3341
3341A	FL3341A
3342	FL3342
3348	FL3348
3349	FL3349
3351	FL3351
3357	FL3357
3708	FL3708
4609	FL4609
4611	FL4611
54198	FL54198
54H08	FL54H08

HARRIS

Original P/N	Lansdale P/N
HD-6600	HL6600
HDI-234	HL234
HD-245	HL245
HD-246	HL246
HD-248	HL248
HM-0104	HL0104
HM-0168	HL0168
HM-0186	HL0186
HM-0198	HL0198
HM-0410	HL0410

BIPOLAR PROM

Original P/N	Lansdale P/N
HPROM-0512	HL0512
HM-7602	HL7602
HM-7603	HL7603
HM-7610	HL7610
HM-7610A	HL7610A
HM-7610B	HL7610B
HM-7611	HL7611
HM-7611A	HL7611A
HM-7611B	HL7611B
HM-7620	HL7620
HM-7620A	HL7620A
HM-7620B	HL7620B
HM-7621	HL7621
HM-7621A	HL7621A
HM-7621B	HL7621B
HM-7640	HL7640
HM-7640A	HL7640A
HM-7641	HL7641
HM-7641A	HL7641A
HM-7642	HL7642
HM-7642A	HL7642A
HM-7642B	HL7642B
HM-7643	HL7643
HM-7643A	HL7643A
HM-7643B	HL7643B
HM-7644A	HL7644A
HM-7649	HL7649
HM-7649A	HL7649A
HM-7681	HL7681
HM-7681A	HL7681A
HM-7685	HL7685
HM-7685A	HL7685A
HM-76161	HL76161
HM-76161A	HL76161A
HM-76161B	HL76161B
HM-76165	HL76165
HM-76321	HL76321
HM-76641	HL76641
HM-76641A	HL76641A

INTEL

Original P/N	Lansdale P/N
M8080A	IL8080A
M8212	IL8212
M8214	IL8214
M8216	IL8216
M8224	IL8224
M8226	IL8226
M8228	IL8228
M8282	IL8282
M8283	IL8283
M8284A	IL8284A
M8286	IL8286
M8287	IL8287
M8288	IL8288
M8289	IL8289

MOTOROLA

SUHL/TTL

Original P/N	Lansdale P/N
MC400	ML400
MC401	ML401
MC402	ML402
MC403	ML403
MC404	ML404
MC405	ML405
MC406	ML406
MC407	ML407
MC408	ML408
MC409	ML409
MC410	ML410
MC411	ML411
MC412	ML412
MC413	ML413
MC414	ML414
MC415	ML415
MC416	ML416
MC419	ML419
MC420	ML420
MC421	ML421
MC422	ML422
MC423	ML423
MC424	ML424
MC425	ML425
MC426	ML426
MC427	ML427
MC428	ML428
MC429	ML429
MC450	ML450
MC451	ML451
MC452	ML452
MC453	ML453
MC454	ML454
MC455	ML455
MC456	ML456
MC457	ML457
MC458	ML458
MC459	ML459
MC460	ML460
MC461	ML461
MC462	ML462
MC463	ML463
MC464	ML464
MC465	ML465

Original P/N	Lansdale P/N
MC466	ML466
MC469	ML469
MC470	ML470
MC471	ML471
MC472	ML472
MC473	ML473
MC474	ML474
MC475	ML475
MC476	ML476
MC477	ML477
MC478	ML478
MC479	ML479
MC500	ML500
MC501	ML501
MC502	ML502
MC503	ML503
MC504	ML504
MC505	ML505
MC506	ML506
MC507	ML507
MC508	ML508
MC509	ML509
MC510	ML510
MC511	ML511
MC512	ML512
MC513	ML513
MC514	ML514
MC515	ML515
MC516	ML516
MC519	ML519
MC520	ML520
MC521	ML521
MC522	ML522
MC523	ML523
MC524	ML524
MC525	ML525
MC526	ML526
MC527	ML527
MC528	ML528
MC529	ML529
MC550	ML550
MC551	ML551
MC552	ML552
MC553	ML553
MC554	ML554
MC555	ML555
MC556	ML556
MC557	ML557
MC558	ML558
MC559	ML559
MC560	ML560
MC561	ML561
MC562	ML562
MC563	ML563
MC564	ML564
MC565	ML565
MC566	ML566
MC569	ML569
MC570	ML570
MC571	ML571
MC572	ML572
MC573	ML573
MC574	ML574
MC575	ML575
MC576	ML576
MC577	ML577
MC578	ML578
MC579	ML579

HTL

Original P/N	Lansdale P/N
MC660T	ML660T
MC661T	ML661T
MC662T	ML662T
MC663T	ML663T
MC664T	ML664T
MC665T	ML665T
MC666T	ML666T
MC667T	ML667T
MC668T	ML668T
MC669T	ML669T
MC670T	ML670T
MC671T	ML671T
MC672T	ML672T
MC673T	ML673T
MC674T	ML674T
MC675T	ML675T
MC676T	ML676T
MC677T	ML677T
MC678T	ML678T
MC679T	ML679T
MC680T	ML680T
MC681T	ML681T
MC682T	ML682T
MC683T	ML683T
MC684T	ML684T
MC685T	ML685T
MC686T	ML686T
MC688T	ML688T
MC689T	ML689T
MC690T	ML690T
MC691T	ML691T
MC693T	ML693T
MC696T	ML696T
MC697T	ML697T
MC699	ML699

RTL

Original P/N	Lansdale P/N
MC800	ML800
MC801	ML801
MC802	ML802
MC803	ML803
MC804	ML804
MC805	ML805
MC806	ML806
MC807	ML807
MC808	ML808
MC809	ML809
MC810	ML810
MC811	ML811
MC812	ML812
MC813	ML813
MC814	ML814
MC815	ML815
MC816	ML816
MC817	ML817
MC818	ML818
MC819	ML819
MC820	ML820
MC821	ML821
MC822	ML822
MC824	ML824
MC825	ML825
MC826	ML826
MC827	ML827
MC828	ML828

Original P/N	Lansdale P/N
MC829	ML829
MC864	ML864
MC867	ML867
MC870	ML870
MC871	ML871
MC874	ML874
MC875	ML875
MC876	ML876
MC877	ML877
MC878	ML878
MC879	ML879
MC880	ML880
MC881	ML881
MC882	ML882
MC883	ML883
MC884	ML884
MC885	ML885
MC886	ML886
MC887	ML887
MC888	ML888
MC889	ML889
MC890	ML890
MC891	ML891
MC892	ML892
MC893	ML893
MC894	ML894
MC896	ML896
MC897	ML897
MC898	ML898
MC899	ML899
MC900	ML900
MC901	ML901
MC902	ML902
MC903	ML903
MC904	ML904
MC905	ML905
MC906	ML906
MC907	ML907
MC908	ML908
MC909	ML909
MC910	ML910
MC911	ML911
MC912	ML912
MC913	ML913
MC914	ML914
MC915	ML915
MC916	ML916
MC917	ML917
MC918	ML918
MC919	ML919
MC920	ML920
MC921	ML921
MC922	ML922
MC924	ML924
MC925	ML925
MC926	ML926
MC927	ML927
MC928	ML928
MC929	ML929
MC971	ML971
MC974	ML974
MC975	ML975
MC976	ML976
MC978	ML978
MC981	ML981
MC982	ML982
MC983	ML983
MC984	ML984
MC985	ML985

Original P/N	Lansdale P/N
MC986	ML986
MC988	ML988
MC989	ML989
MC990	ML990
MC991	ML991
MC992	ML992
MC993	ML993
MC996	ML996
MC997	ML997
MC998	ML998
MC999	ML999
MC9801	ML9801
MC9802	ML9802
MC9804	ML9804
MC9807	ML9807
MC9809	ML9809
MC9813	ML9813
MC9814	ML9814
MC9815	ML9815
MC9818	ML9818
MC9819	ML9819
MC9820	ML9820
MC9821	ML9821
MC9822	ML9822
MC9823	ML9823
MC9824	ML9824
MC9825	ML9825

DTL

Original P/N	Lansdale P/N
MC830	ML830
MC831	ML831
MC832	ML832
MC833	ML833
MC834	ML834
MC835	ML835
MC836	ML836
MC837	ML837
MC838	ML838
MC839	ML839
MC840	ML840
MC841	ML841
MC843	ML843
MC844	ML844
MC845	ML845
MC846	ML846
MC847	ML847
MC848	ML848
MC849	ML849
MC850	ML850
MC851	ML851
MC852	ML852
MC853	ML853
MC855	ML855
MC856	ML856
MC857	ML857
MC858	ML858
MC861	ML861
MC862	ML862
MC863	ML863
MC930	ML930
MC931	ML931
MC932	ML932
MC933	ML933
MC934	ML934
MC935	ML935
MC936	ML936
MC937	ML937
MC938	ML938
MC939	ML939
MC940	ML940
MC941	ML941
MC944	ML944
MC945	ML945
MC946	ML946
MC947	ML947
MC948	ML948
MC949	ML949
MC950	ML950
MC951	ML951
MC952	ML952
MC953	ML953
MC955	ML955
MC956	ML956
MC957	ML957
MC958	ML958
MC961	ML961
MC962	ML962
MC963	ML963
MC1800	ML1800
MC1801	ML1801
MC1802	ML1802
MC1803	ML1803
MC1804	ML1804
MC1805	ML1805
MC1806	ML1806
MC1807	ML1807
MC1808	ML1808
MC1809	ML1809
MC1810	ML1810
MC1811	ML1811
MC1812	ML1812
MC1813	ML1813
MC1814	ML1814
MC1815	ML1815
MC1816	ML1816
MC1818	ML1818
MC1900	ML1900
MC1901	ML1901
MC1902	ML1902
MC1903	ML1903
MC1904	ML1904
MC1905	ML1905
MC1906	ML1906
MC1907	ML1907
MC1908	ML1908
MC1909	ML1909
MC1910	ML1910
MC1911	ML1911
MC1912	ML1912
MC1913	ML1913
MC1914	ML1914
MC1915	ML1915
MC1916	ML1916
MC1917	ML1917
MC1918	ML1918

MECL

Original P/N	Lansdale P/N
MC1217	ML1217
MC1226	ML1226
MC1239	ML1239
MC1668	ML1668
MC1674	ML1674
MC1694	ML1694
MC10687	ML10687
MC12560	ML12560

LINEAR

Original P/N	Lansdale P/N
MC1503	ML1503
MC1506	ML1506
MC1510	ML1510
MC1512	ML1512
MC1514	ML1514
MC1520	ML1520
MC1530	ML1530
MC1531	ML1531
MC1533	ML1533
MC1535	ML1535
MC1538	ML1538
MC1552	ML1552
MC1553	ML1553
MC1561	ML1561
MC1563	ML1563
MC1569	ML1569
MC1590	ML1590
MC1710	ML1710
MC3357	ML3357
MC3558	ML3558
MC10318	ML10318
MMH0026	ML0026

TTL II/SUHL

Original P/N	Lansdale P/N
MC2000	ML2000
MC2001	ML2001
MC2002	ML2002
MC2003	ML2003
MC2004	ML2004
MC2005	ML2005
MC2006	ML2006
MC2007	ML2007
MC2009	ML2009
MC2011	ML2011
MC2012	ML2012
MC2013	ML2013
MC2016	ML2016
MC2018	ML2018
MC2023	ML2023
MC2024	ML2024
MC2025	ML2025
MC2026	ML2026
MC2028	ML2028
MC2050	ML2050
MC2051	ML2051
MC2052	ML2052
MC2053	ML2053
MC2054	ML2054
MC2055	ML2055
MC2056	ML2056
MC2057	ML2057
MC2059	ML2059
MC2061	ML2061
MC2062	ML2062
MC2063	ML2063
MC2065	ML2065
MC2066	ML2066
MC2068	ML2068
MC2073	ML2073
MC2074	ML2074
MC2075	ML2075
MC2076	ML2076
MC2078	ML2078
MC2100	ML2100
MC2101	ML2101

Original P/N	Lansdale P/N
MC2102	ML2102
MC2103	ML2103
MC2104	ML2104
MC2105	ML2105
MC2106	ML2106
MC2107	ML2107
MC2109	ML2109
MC2111	ML2111
MC2112	ML2112
MC2113	ML2113
MC2116	ML2116
MC2118	ML2118
MC2123	ML2123
MC2124	ML2124
MC2125	ML2125
MC2126	ML2126
MC2128	ML2128
MC2150	ML2150
MC2151	ML2151
MC2152	ML2152
MC2153	ML2153
MC2154	ML2154
MC2155	ML2155
MC2156	ML2156
MC2157	ML2157
MC2159	ML2159
MC2161	ML2161
MC2162	ML2162
MC2163	ML2163
MC2165	ML2165
MC2166	ML2166
MC2168	ML2168
MC2173	ML2173
MC2174	ML2174
MC2175	ML2175
MC2176	ML2176
MC2178	ML2178
TTL III	
MC3000	ML3000
MC3001	ML3001
MC3002	ML3002
MC3003	ML3003
MC3004	ML3004
MC3005	ML3005
MC3006	ML3006
MC3007	ML3007
MC3008	ML3008
MC3009	ML3009
MC3010	ML3010
MC3011	ML3011
MC3012	ML3012
MC3015	ML3015
MC3016	ML3016
MC3018	ML3018
MC3019	ML3019
MC3020	ML3020
MC3021	ML3021
MC3022	ML3022
MC3023	ML3023
MC3024	ML3024
MC3025	ML3025
MC3026	ML3026
MC3028	ML3028
MC3029	ML3029
MC3030	ML3030
MC3031	ML3031
MC3032	ML3032
MC3033	ML3033
MC3034	ML3034
MC3050	ML3050
MC3051	ML3051
MC3052	ML3052
MC3053	ML3053
MC3054	ML3054
MC3055	ML3055
MC3060	ML3060
MC3061	ML3061
MC3062	ML3062
MC3063	ML3063
MC3064	ML3064
MC3100	ML3100
MC3101	ML3101
MC3102	ML3102
MC3103	ML3103
MC3104	ML3104
MC3105	ML3105
MC3106	ML3106
MC3107	ML3107
MC3108	ML3108
MC3109	ML3109
MC3110	ML3110
MC3111	ML3111
MC3112	ML3112
MC3115	ML3115
MC3116	ML3116
MC3118	ML3118
MC3119	ML3119
MC3120	ML3120
MC3121	ML3121
MC3122	ML3122
MC3123	ML3123
MC3124	ML3124
MC3125	ML3125
MC3126	ML3126
MC3128	ML3128
MC3129	ML3129
MC3130	ML3130
MC3131	ML3131
MC3132	ML3132
MC3133	ML3133
MC3134	ML3134
MC3150	ML3150
MC3151	ML3151
MC3152	ML3152
MC3153	ML3153
MC3154	ML3154
MC3155	ML3155
MC3160	ML3160
MC3161	ML3161
MC3162	ML3162
MC3163	ML3163
MC3164	ML3164
TTL	
MC4000	ML4000
MC4001	ML4001
MC4002	ML4002
MC4004	ML4004
MC4005	ML4005
MC4006	ML4006
MC4007	ML4007
MC4008	ML4008
MC4010	ML4010
MC4012	ML4012
MC4015	ML4015
MC4016	ML4016
MC4017	ML4017
MC4018	ML4018
MC4019	ML4019
MC4021	ML4021
MC4022	ML4022
MC4023	ML4023
MC4026	ML4026
MC4027	ML4027
MC4028	ML4028
MC4029	ML4029
MC4030	ML4030
MC4031	ML4031
MC4032	ML4032
MC4035	ML4035
MC4037	ML4037
MC4038	ML4038
MC4039	ML4039
MC4040	ML4040
MC4041	ML4041
MC4042	ML4042
MC4043	ML4043
MC4048	ML4048
MC4050	ML4050
MC4051	ML4051
MC4052	ML4052
MC4053	ML4053
MC4054	ML4054
MC4055	ML4055
MC4056	ML4056
MC4058	ML4058
MC4060	ML4060
MC4062	ML4062
MC4064	ML4064
MC4068	ML4068
MC4300	ML4300
MC4301	ML4301
MC4302	ML4302
MC4304	ML4304
MC4305	ML4305
MC4306	ML4306
MC4307	ML4307
MC4308	ML4308
MC4310	ML4310
MC4312	ML4312
MC4315	ML4315
MC4316	ML4316
MC4317	ML4317
MC4318	ML4318
MC4319	ML4319
MC4321	ML4321
MC4322	ML4322
MC4323	ML4323
MC4326	ML4326
MC4327	ML4327
MC4328	ML4328
MC4329	ML4329
MC4330	ML4330
MC4331	ML4331
MC4332	ML4332
MC4335	ML4335
MC4337	ML4337
MC4338	ML4338
MC4339	ML4339
MC4340	ML4340
MC4341	ML4341
MC4342	ML4342
MC4343	ML4343
MC4350	ML4350

Original P/N	Lansdale P/N
MC4351	ML4351
MC4352	ML4352
MC4353	ML4353
MC4354	ML4354
MC4355	ML4355
MC4356	ML4356
MC4358	ML4358
MC4360	ML4360
MC4362	ML4362
MC4364	ML4364
MC4368	ML4368
TTL-SUHL II	
MC5090	ML5090
MC5092	ML5092
MC5111	ML5111
MC5113	ML5113
MC5121	ML5121
MC5123	ML5123
MC5131	ML5131
MC5133	ML5133
MC5141	ML5141
MC5143	ML5143
MC5151	ML5151
MC5153	ML5153
MC5163	ML5163
MC5171	ML5171
MC5181	ML5181
MC5183	ML5183
MC5191	ML5191
MC5193	ML5193
TTL	
MC5400	ML5400
MC5401	ML5401
MC5402	ML5402
MC5403	ML5403
MC5404	ML5404
MC5405	ML5405
MC5406	ML5406
MC5407	ML5407
MC5408	ML5408
MC5409	ML5409
MC5410	ML5410
MC5412	ML5412
MC5413	ML5413
MC5414	ML5414
MC5416	ML5416
MC5417	ML5417
MC5420	ML5420
MC5423	ML5423
MC5425	ML5425
MC5426	ML5426
MC5427	ML5427
MC5428	ML5428
MC5430	ML5430
MC5437	ML5437
MC5438	ML5438
MC5440	ML5440
MC5441A	ML5441A
MC5442	ML5442
MC5442A	ML5442A
MC5443	ML5443
MC5444	ML5444
MC5445	ML5445
MC5446	ML5446
MC5447	ML5447
MC5448	ML5448
MC5449	ML5449
MC5450	ML5450
MC5451	ML5451
MC5453	ML5453
MC5454	ML5454
MC5460	ML5460
MC5470	ML5470
MC5472	ML5472
MC5473	ML5473
MC5474	ML5474
MC5475	ML5475
MC5476	ML5476
MC5477	ML5477
MC5479	ML5479
MC5480	ML5480
MC5481	ML5481
MC5483	ML5483
MC5484	ML5484
MC5485	ML5485
MC5486	ML5486
MC5490	ML5490
MC5490A	ML5490A
MC5491A	ML5491A
MC5492	ML5492
MC5492A	ML5492A
MC5493	ML5493
MC5493A	ML5493A
MC5494	ML5494
MC5495	ML5495
MC5495A	ML5495A
MC5496	ML5496
MC5497	ML5497
MC54100	ML54100
MC54107	ML54107
MC54120	ML54120
MC54121	ML54121
MC54122	ML54122
MC54123	ML54123
MC54128	ML54128
MC54132	ML54132
MC54136	ML54136
MC54141	ML54141
MC54145	ML54145
MC54150	ML54150
MC54151	ML54151
MC54152	ML54152
MC54153	ML54153
MC54154	ML54154
MC54155	ML54155
MC54156	ML54156
MC54160	ML54160
MC54161	ML54161
MC54162	ML54162
MC54163	ML54163
MC54164	ML54164
MC54164A	ML54164A
MC54165	ML54165
MC54166	ML54166
MC54167	ML54167
MC54174	ML54174
MC54175	ML54175
MC54176	ML54176
MC54177	ML54177
MC54178	ML54178
MC54179	ML54179
MC54180	ML54180
MC54181	ML54181
MC54182	ML54182
MC54190	ML54190
MC54191	ML54191
MC54192	ML54192
MC54193	ML54193
MC54194	ML54194
MC54195	ML54195
MC54196	ML54196
MC54197	ML54197
MC54198	ML54198
MC54199	ML54199
MC54279	ML54279
MC54290	ML54290
MC54293	ML54293
MC54298	ML54298
MC15482	ML15482
MC25482	ML25482
MC7400	ML7400
MC7401	ML7401
MC7402	ML7402
MC7403	ML7403
MC7404	ML7404
MC7405	ML7405
MC7406	ML7406
MC7407	ML7407
MC7408	ML7408
MC7409	ML7409
MC7410	ML7410
MC7412	ML7412
MC7413	ML7413
MC7414	ML7414
MC7416	ML7416
MC7417	ML7417
MC7420	ML7420
MC7423	ML7423
MC7425	ML7425
MC7426	ML7426
MC7427	ML7427
MC7428	ML7428
MC7430	ML7430
MC7437	ML7437
MC7438	ML7438
MC7440	ML7440
MC7441A	ML7441A
MC7442	ML7442
MC7442A	ML7442A
MC7443	ML7443
MC7444	ML7444
MC7445	ML7445
MC7446	ML7446
MC7447	ML7447
MC7448	ML7448
MC7449	ML7449
MC7450	ML7450
MC7451	ML7451
MC7453	ML7453
MC7454	ML7454
MC7460	ML7460
MC7470	ML7470
MC7472	ML7472
MC7473	ML7473
MC7474	ML7474
MC7475	ML7475
MC7476	ML7476
MC7477	ML7477
MC7479	ML7479
MC7480	ML7480
MC7481	ML7481
MC7483	ML7483
MC7484	ML7484

Original P/N	Lansdale P/N
MC7485	ML7485
MC7486	ML7486
MC7490	ML7490
MC7490A	ML7490A
MC7491A	ML7491A
MC7492	ML7492
MC7492A	ML7492A
MC7493	ML7493
MC7493A	ML7493A
MC7494	ML7494
MC7495	ML7495
MC7495A	ML7495A
MC7496	ML7496
MC7497	ML7497
MC74100	ML74100
MC74107	ML74107
MC74120	ML74120
MC74121	ML74121
MC74122	ML74122
MC74123	ML74123
MC74128	ML74128
MC74132	ML74132
MC74136	ML74136
MC74141	ML74141
MC74145	ML74145
MC74150	ML74150
MC74151	ML74151
MC74152	ML74152
MC74153	ML74153
MC74154	ML74154
MC74155	ML74155
MC74156	ML74156
MC74160	ML74160
MC74161	ML74161
MC74162	ML74162
MC74163	ML74163
MC74164	ML74164
MC74164A	ML74164A
MC74165	ML74165
MC74166	ML74166
MC74167	ML74167
MC74174	ML74174
MC74175	ML74175
MC74176	ML74176
MC74177	ML74177
MC74178	ML74178
MC74179	ML74179
MC74180	ML74180
MC74181	ML74181
MC74182	ML74182
MC74190	ML74190
MC74191	ML74191
MC74192	ML74192
MC74193	ML74193
MC74194	ML74194
MC74195	ML74195
MC74196	ML74196
MC74197	ML74197
MC74198	ML74198
MC74199	ML74199
MC74279	ML74279
MC74290	ML74290
MC74293	ML74293
MC74298	ML74298
MC17482	ML17482
MC27482	ML27482

TTL III

Original P/N	Lansdale P/N
MC54H00	ML54H00
MC54H01	ML54H01
MC54H02	ML54H02
MC54H04	ML54H04
MC54H05	ML54H05
MC54H08	ML54H08
MC54H10	ML54H10
MC54H11	ML54H11
MC54H12	ML54H12
MC54H20	ML54H20
MC54H21	ML54H21
MC54H22	ML54H22
MC54H28	ML54H28
MC54H29	ML54H29
MC54H30	ML54H30
MC54H31	ML54H31
MC54H32	ML54H32
MC54H36	ML54H36
MC54H39	ML54H39
MC54H40	ML54H40
MC54H50	ML54H50
MC54H51	ML54H51
MC54H52	ML54H52
MC54H53	ML54H53
MC54H54	ML54H54
MC54H55	ML54H55
MC54H60	ML54H60
MC54H61	ML54H61
MC54H62	ML54H62
MC54H71	ML54H71
MC54H72	ML54H72
MC54H73	ML54H73
MC54H74	ML54H74
MC54H79	ML54H79
MC54H86	ML54H86
MC54H87	ML54H87
MC54H89	ML54H89
MC54H101	ML54H101
MC54H102	ML54H102
MC54H103	ML54H103
MC54H108	ML54H108
MC54H116	ML54H116
MC54H117	ML54H117
MC54H119	ML54H119
MC54H120	ML54H120
MC74H00	ML74H00
MC74H01	ML74H01
MC74H02	ML74H02
MC74H04	ML74H04
MC74H05	ML74H05
MC74H08	ML74H08
MC74H10	ML74H10
MC74H11	ML74H11
MC74H12	ML74H12
MC74H20	ML74H20
MC74H21	ML74H21
MC74H22	ML74H22
MC74H28	ML74H28
MC74H29	ML74H29
MC74H30	ML74H30
MC74H31	ML74H31
MC74H32	ML74H32
MC74H36	ML74H36
MC74H39	ML74H39
MC74H40	ML74H40
MC74H50	ML74H50
MC74H51	ML74H51
MC74H52	ML74H52
MC74H53	ML74H53
MC74H54	ML74H54
MC74H55	ML74H55
MC74H60	ML74H60
MC74H61	ML74H61
MC74H62	ML74H62
MC74H71	ML74H71
MC74H72	ML74H72
MC74H73	ML74H73
MC74H74	ML74H74
MC74H79	ML74H79
MC74H86	ML74H86
MC74H87	ML74H87
MC74H89	ML74H89
MC74H101	ML74H101
MC74H102	ML74H102
MC74H103	ML74H103
MC74H108	ML74H108
MC74H116	ML74H116
MC74H117	ML74H117
MC74H119	ML74H119
MC74H120	ML74H120

Super Schottky TTL

Original P/N	Lansdale P/N
MC54SS00	ML54SS00
MC54SS02	ML54SS02
MC54SS04	ML54SS04
MC54SS08	ML54SS08
MC54SS10	ML54SS10
MC54SS11	ML54SS11
MC54SS20	ML54SS20
MC54SS21	ML54SS21
MC54SS27	ML54SS27
MC54SS32	ML54SS32
MC54SS51	ML54SS51
MC54SS64	ML54SS64
MC54SS74	ML54SS74
MC54SS86	ML54SS86
MC54SS133	ML54SS133
MC54SS138	ML54SS138
MC54SS151	ML54SS151
MC54SS153	ML54SS153
MC54SS157	ML54SS157
MC54SS158	ML54SS158
MC54SS174	ML54SS174
MC54SS175	ML54SS175
MC54SS181	ML54SS181
MC54SS182	ML54SS182
MC54SS251	ML54SS251
MC54SS258	ML54SS258
MC54SS328	ML54SS328

TTL

Original P/N	Lansdale P/N
MC7200	ML7200
MC7201	ML7201
MC7202	ML7202
MC7203	ML7203
MC7233	ML7233
MC7234	ML7234
MC7235	ML7235
MC7241	ML7241
MC7242	ML7242
MC7250	ML7250
MC7251	ML7251
MC7260	ML7260
MC7261	ML7261

Original P/N	Lansdale P/N
MC7266	ML7266
MC7267	ML7267
MC7270	ML7270
MC7271	ML7271
MC7280	ML7280
MC7281	ML7281
MC7284	ML7284
MC7285	ML7285
MC7288	ML7288
MC7290	ML7290
MC7291	ML7291
MC8200	ML8200
MC8201	ML8201
MC8202	ML8202
MC8203	ML8203
MC8233	ML8233
MC8234	ML8234
MC8235	ML8235
MC8241	ML8241
MC8242	ML8242
MC8250	ML8250
MC8251	ML8251
MC8260	ML8260
MC8261	ML8261
MC8266	ML8266
MC8267	ML8267
MC8270	ML8270
MC8271	ML8271
MC8280	ML8280
MC8281	ML8281
MC8284	ML8284
MC8285	ML8285
MC8288	ML8288
MC8290	ML8290
MC8291	ML8291

TTL-Interface

MC8T95	ML8T95
MC8T96	ML8T96
MC8T97	ML8T97
MC8T98	ML8T98

TTL

MC8300	ML8300
MC8301	ML8301
MC8304	ML8304
MC8306	ML8306
MC8307	ML8307
MC8308	ML8308
MC8309	ML8309
MC8310	ML8310
MC8311	ML8311
MC8312	ML8312
MC8314	ML8314
MC8316	ML8316
MC8317	ML8317
MC8318	ML8318
MC8322	ML8322
MC8324	ML8324
MC8328	ML8328
MC8601	ML8601
MC8602	ML8602
MC9300	ML9300
MC9301	ML9301
MC9304	ML9304
MC9306	ML9306
MC9307	ML9307
MC9308	ML9308
MC9309	ML9309
MC9310	ML9310
MC9311	ML9311
MC9312	ML9312
MC9314	ML9314
MC9316	ML9316
MC9317	ML9317
MC9318	ML9318
MC9322	ML9322
MC9324	ML9324
MC9328	ML9328
MC9601	ML9601
MC9602	ML9602

CMOS

MC14002B	ML14002B
MC14006B	ML14006B
MC14008B	ML14008B
MC14022B	ML14022B
MC14034B	ML14034B
MC14035B	ML14035B
MC14068B	ML14068B
MC14078B	ML14078B
MC14162B	ML14162B
MC14163B	ML14163B
MC14194B	ML14194B
MC14506A	ML14506A
MC14508B	ML14508B
MC14510B	ML14510B
MC14514B	ML14514B
MC14515B	ML14515B
MC14516B	ML14516B
MC14521B	ML14521B
MC14522B	ML14522B
MC14524B	ML14524B
MC14526B	ML14526B
MC14529B	ML14529B
MC14531B	ML14531B
MC14549B	ML14549B
MC14551B	ML14551B
MC14553B	ML14553B
MC14556B	ML14556B
MC14559B	ML14559B
MC14560B	ML14560B
MC14561B	ML14561B
MC14562B	ML14562B
MC14568B	ML14568B

NATIONAL

DM75L54	NL75L54

RAYTHEON

DTL

RM201	RL201
RM202	RL202
RM204	RL204
RM206	RL206
RM208	RL208
RM210	RL210
RM211	RL211
RM212	RL212
RM213	RL213
RM214	RL214
RM215	RL215
RM216	RL216
RM217	RL217
RM220	RL220
RM221	RL221
RM224	RL224
RM225	RL225
RM226	RL226
RM227	RL227
RM231	RL231
RM234	RL234
RM236	RL236
RM241	RL241
RM246	RL246
RM261	RL261
RM266	RL266
RM286	RL286
RM288	RL288
RM296	RL296

DTL

RM930	ML930
RM932	ML932
RM933	ML933
RM934	ML934
RM935	ML935
RM936	ML936
RM937	ML937
RM939	ML939
RM940	ML940
RM941	ML941
RM944	ML944
RM945	ML945
RM946	ML946
RM948	ML948
RM949	ML949
RM950	ML950
RM951	ML951
RM957	ML957
RM958	ML958
RM961	ML961
RM962	ML962
RM963	ML963
RM993	ML953
RM994	ML956
RM997	ML955
RM999	ML952

TTL

RM8200	SL8200
RM8201	SL8201
RM8203	SL8203
RM8230	SL8230
RM8231	SL8231
RM8232	SL8232
RM8241	SL8241
RM8242	SL8242
RM8243	SL8243
RM8250	SL8250
RM8251	SL8251
RM8252	SL8252
RM8260	SL8260
RM8261	SL8261

Original P/N	Lansdale P/N
RM8263	SL8263
RM8264	SL8264
RM8267	SL8267
RM8270	SL8270
RM8274	SL8274
RM8275	SL8275
RM8277	SL8277
RM8280	SL8280
RM8281	SL8281
RM8284	SL8284
RM8285	SL8285
RM8290	SL8290
RM8291	SL8291
RM8293	SL8293

TTL - SUHL

Original P/N	Lansdale P/N
RF30	ML521
RF31	ML571
RF50	RL50
RF51	ML565
RF60	ML516
RF61	ML566
RF100	ML523
RF101	ML573
RF110	RL110
RF111	ML574
RF120	ML2123
RF121	ML2173
RF130	ML2124
RF131	ML2174
RF200	ML2125
RF201	ML2175
RF210	ML2126
RF211	ML2176
RF230	ML2075
RF250	ML2109
RF251	ML2159
RF9601	ML9601

TTL-SUHL

Original P/N	Lansdale P/N
RG40	ML500
RG41	ML550
RG50	ML501
RG51	ML551
RG60	ML502
RG61	ML552
RG70	ML520
RG71	ML570
RG80	ML526
RG81	ML576
RG83	ML476
RG90	ML503
RG91	ML553
RG110	ML505
RG111	ML555
RG120	ML506
RG121	ML556
RG130	ML507
RG131	ML557
RG140	ML508
RG141	ML558
RG150	ML509
RG151	ML559
RG160	ML519
RG161	ML569
RG170	ML510
RG171	ML560
RG180	ML511
RG181	ML561
RG190	ML512
RG191	ML562
RG200	ML2111
RG201	ML2161
RG210	ML2100
RG211	ML2150
RG220	ML2101
RG221	ML2151
RG223	ML2051
RG230	ML2102
RG231	ML2152
RG240	ML2103
RG241	ML2153
RG250	ML2104
RG251	ML2154
RG260	ML2105
RG261	ML2155
RG270	ML2106
RG271	ML2156
RG280	ML527
RG281	ML577
RG290	ML528
RG291	ML578
RG300	ML2112
RG301	ML2162
RG310	ML2113
RG311	ML2163
RG320	ML2107
RG321	ML2157
RG330	RL330
RG331	RL331
RG340	RL340
RG341	RL341
RG370	ML529
RG371	ML579
RG380	ML2116
RG381	ML2166
RG7520	ML2165
RG7521	ML2165

TTL-SUHL

Original P/N	Lansdale P/N
RL10	ML4326
RL11	ML4327
RL20	ML4328
RL21	ML4329
RL30	ML4330
RL31	ML4331
RL40	ML4332
RL61	ML4335
RL71	ML4337
RL80	ML4304
RL81	ML4305

SIGNETICS

DTL

Original P/N	Lansdale P/N
SE101	SL101
SE102	SL102
SE105	SL105
SE106	SL106
SE110	SL110
SE111	SL111
SE112	SL112
SE113	SL113
SE115	SL115
SE116	SL116
SE124	SL124
SE125	SL125
SE150	SL150
SE155	SL155
SE156	SL156
SE157	SL157
SE160	SL160
SE161	SL161
SE162	SL162
SE170	SL170
SE180	SL180
SE181	SL181
SE415	SL415
SE416	SL416
SE417	SL417
SE440	SL440
SE455	SL455
SE470	SL470
SE471	SL471
SE480	SL480
SE481	SL481
SE490	SL490
SE511	SL511
SE526	SL526
SE616	SL616
SE620	SL620
SE629	SL629
SE631	SL631
SE659	SL659
SE670	SL670
SE680	SL680
SE690	SL690
CS700	SL700
CS701	SL701
CS704	SL704
CS705	SL705
CS709	SL709
CS716	SL716
CS720	SL720
CS721	SL721
CS727	SL727
CS729	SL729
CS730	SL730
CS731	SL731
CS732	SL732
S8162	SL8162
S8415	SL8415
S8416	SL8416
S8417	SL8417
S8440	SL8440
S8455	SL8455
S8470	SL8470
S8471	SL8471
S8480	SL8480
S8481	SL8481
S8490	SL8490

UTILOGIC II

Original P/N	Lansdale P/N
SP300	SL300
SP301	SL301
SP302	SL302
SP304	SL304
SP305	SL305

Original P/N	Lansdale P/N
SP306	SL306
SP314	SL314
SP315	SL315
SP316	SL316
SP317	SL317
SP320	SL320
SP321	SL321
SP322	SL322
SP328	SL328
SP331	SL331
SP332	SL332
SP333	SL333
SP334	SL334
SP337	SL337
SP352	SL352
SP356	SL356
SP357	SL357
SP358	SL358
SP362	SL362
SP363	SL363
SP370	SL370
SP374	SL374
SP375	SL375
SP377	SL377
SP380	SL380
SP381	SL381
SP384	SL384
SP387	SL387
SP391	SL391
SP3271	SL3271
SP3280	SL3280
SP3281	SL3281

LINEAR

Original P/N	Lansdale P/N
MC1488	SL1488
MC1489	SL1489
MC1489A	SL1489A

TTL

Original P/N	Lansdale P/N
S5400	SL5400
S5401	SL5401
S5402	SL5402
S5403	SL5403
S5404	SL5404
S5405	SL5405
S5406	SL5406
S5407	SL5407
S5408	SL5408
S5409	SL5409
S5410	SL5410
S5411	SL5411
S5413	SL5413
S5414	SL5414
S5416	SL5416
S5417	SL5417
S5420	SL5420
S5421	SL5421
S5425	SL5425
S5426	SL5426
S5427	SL5427
S5428	SL5428
S5430	SL5430
S5432	SL5432
S5433	SL5433
S5437	SL5437
S5438	SL5438
S5439	SL5439
S5440	SL5440
S5442	SL5442
S5445	SL5445
S5447	SL5447
S5448	SL5448
S5450	SL5450
S5451	SL5451
S5453	SL5453
S5454	SL5454
S5460	SL5460
S5470	SL5470
S5472	SL5472
S5473	SL5473
S5474	SL5474
S5475	SL5475
S5476	SL5476
S5480	SL5480
S5483	SL5483
S5485	SL5485
S5486	SL5486
S5490	SL5490
S5492	SL5492
S5493	SL5493
S5494	SL5494
S5495	SL5495
S5496	SL5496
S54100	SL54100
S54107	SL54107
S54109	SL54109
S54116	SL54116
S54121	SL54121
S54123	SL54123
S54125	SL54125
S54126	SL54126
S54128	SL54128
S54132	SL54132
S54145	SL54145
S54148	SL54148
S54150	SL54150
S54151	SL54151
S54152	SL54152
S54153	SL54153
S54154	SL54154
S54155	SL54155
S54156	SL54156
S54157	SL54157
S54158	SL54158
S54160	SL54160
S54161	SL54161
S54163	SL54163
S54164	SL54164
S54165	SL54165
S54166	SL54166
S54170	SL54170
S54173	SL54173
S54174	SL54174
S54175	SL54175
S54180	SL54180
S54181	SL54181
S54182	SL54182
S54190	SL54190
S54191	SL54191
S54192	SL54192
S54193	SL54193
S54194	SL54194
S54195	SL54195
S54198	SL54198
S54199	SL54199
S54221	SL54221
S54279	SL54279
S54298	SL54298
S54365A	SL54365A
S54366A	SL54366A
S54367A	SL54367A
S54368A	SL54368A
N7400	SL7400
N7401	SL7401
N7402	SL7402
N7403	SL7403
N7404	SL7404
N7405	SL7405
N7406	SL7406
N7407	SL7407
N7408	SL7408
N7409	SL7409
N7410	SL7410
N7411	SL7411
N7413	SL7413
N7414	SL7414
N7416	SL7416
N7417	SL7417
N7420	SL7420
N7421	SL7421
N7425	SL7425
N7426	SL7426
N7427	SL7427
N7428	SL7428
N7430	SL7430
N7432	SL7432
N7433	SL7433
N7437	SL7437
N7438	SL7438
N7439	SL7439
N7440	SL7440
N7442	SL7442
N7445	SL7445
N7447	SL7447
N7448	SL7448
N7450	SL7450
N7451	SL7451
N7453	SL7453
N7454	SL7454
N7460	SL7460
N7470	SL7470
N7472	SL7472
N7473	SL7473
N7474	SL7474
N7475	SL7475
N7476	SL7476
N7480	SL7480
N7483	SL7483
N7485	SL7485
N7486	SL7486
N7490	SL7490
N7492	SL7492
N7493	SL7493
N7494	SL7494
N7495	SL7495
N7496	SL7496
N74100	SL74100
N74107	SL74107
N74109	SL74109
N74116	SL74116
N74121	SL74121
N74123	SL74123

Original P/N	Lansdale P/N
N74125	SL74125
N74126	SL74126
N74128	SL74128
N74132	SL74132
N74145	SL74145
N74148	SL74148
N74150	SL74150
N74151	SL74151
N74152	SL74152
N74153	SL74153
N74154	SL74154
N74155	SL74155
N74156	SL74156
N74157	SL74157
N74158	SL74158
N74160	SL74160
N74161	SL74161
N74163	SL74163
N74164	SL74164
N74165	SL74165
N74166	SL74166
N74170	SL74170
N74173	SL74173
N74174	SL74174
N74175	SL74175
N74180	SL74180
N74181	SL74181
N74182	SL74182
N74190	SL74190
N74191	SL74191
N74192	SL74192
N74193	SL74193
N74194	SL74194
N74195	SL74195
N74198	SL74198
N74199	SL74199
N74221	SL74221
N74279	SL74279
N74298	SL74298
N74365A	SL74365A
N74366A	SL74366A
N74367A	SL74367A
N74368A	SL74368A

TTL III

Original P/N	Lansdale P/N
S54H00	SL54H00
S54H01	SL54H01
S54H08	SL54H08
S54H10	SL54H10
S54H11	SL54H11
S54H20	SL54H20
S54H21	SL54H21
S54H22	SL54H22
S54H30	SL54H30
S54H40	SL54H40
S54H52	SL54H52
S54H53	SL54H53
S54H54	SL54H54
S54H55	SL54H55
S54H60	SL54H60
S54H61	SL54H61
S54H62	SL54H62
S54H71	SL54H71
S54H72	SL54H72
S54H73	SL54H73
S54H74	SL54H74
S54H76	SL54H76
S54H101	SL54H101
S54H102	SL54H102
S54H103	SL54H103
S54H106	SL54H106
S54H108	SL54H108
N74H00	SL74H00
N74H01	SL74H01
N74H08	SL74H08
N74H10	SL74H10
N74H11	SL74H11
N74H20	SL74H20
N74H21	SL74H21
N74H22	SL74H22
N74H30	SL74H30
N74H40	SL74H40
N74H52	SL74H52
N74H53	SL74H53
N74H54	SL74H54
N74H55	SL74H55
N74H60	SL74H60
N74H61	SL74H61
N74H62	SL74H62
N74H71	SL74H71
N74H72	SL74H72
N74H73	SL74H73
N74H74	SL74H74
N74H76	SL74H76
N74H101	SL74H101
N74H102	SL74H102
N74H103	SL74H103
N74H106	SL74H106
N74H108	SL74H108

Low Power Schottky TTL

Original P/N	Lansdale P/N
S54LS00	SL54LS00
S54LS01	SL54LS01
S54LS02	SL54LS02
S54LS04	SL54LS04
S54LS05	SL54LS05
S54LS08	SL54LS08
S54LS09	SL54LS09
S54LS10	SL54LS10
S54LS11	SL54LS11
S54LS13	SL54LS13
S54LS14	SL54LS14
S54LS20	SL54LS20
S54LS21	SL54LS21
S54LS26	SL54LS26
S54LS27	SL54LS27
S54LS30	SL54LS30
S54LS32	SL54LS32
S54LS33	SL54LS33
S54LS37	SL54LS37
S54LS38	SL54LS38
S54LS40	SL54LS40
S54LS42	SL54LS42
S54LS51	SL54LS51
S54LS54	SL54LS54
S54LS73	SL54LS73
S54LS74A	SL54LS74A
S54LS75	SL54LS75
S54LS76	SL54LS76
S54LS83A	SL54LS83A
S54LS85	SL54LS85
S54LS86	SL54LS86
S54LS90	SL54LS90
S54LS92	SL54LS92
S54LS93	SL54LS93
S54LS95B	SL54LS95B
S54LS96	SL54LS96
S54LS107	SL54LS107
S54LS109	SL54LS109
S54LS112	SL54LS112
S54LS113	SL54LS113
S54LS125	SL54LS125
S54LS125A	SL54LS125A
S54LS126A	SL54LS126A
S54LS132	SL54LS132
S54LS136	SL54LS136
S54LS138	SL54LS138
S54LS139	SL54LS139
S54LS151	SL54LS151
S54LS153	SL54LS153
S54LS154	SL54LS154
S54LS155	SL54LS155
S54LS156	SL54LS156
S54LS157	SL54LS157
S54LS158	SL54LS158
S54LS160A	SL54LS160A
S54LS161A	SL54LS161A
S54LS162A	SL54LS162A
S54LS163A	SL54LS163A
S54LS164	SL54LS164
S54LS169A	SL54LS169A
S54LS170	SL54LS170
S54LS173	SL54LS173
S54LS174	SL54LS174
S54LS175	SL54LS175
S54LS181	SL54LS181
S54LS191	SL54LS191
S54LS192	SL54LS192
S54LS193	SL54LS193
S54LS194A	SL54LS194A
S54LS197	SL54LS197
S54LS240	SL54LS240
S54LS241	SL54LS241
S54LS242	SL54LS242
S54LS243	SL54LS243
S54LS244	SL54LS244
S54LS245	SL54LS245
S54LS251	SL54LS251
S54LS253	SL54LS253
S54LS256	SL54LS256
S54LS257A	SL54LS257A
S54LS258A	SL54LS258A
S54LS259	SL54LS259
S54LS260	SL54LS260
S54LS266	SL54LS266
S54LS273	SL54LS273
S54LS283	SL54LS283
S54LS295B	SL54LS295B
S54LS298	SL54LS298
S54LS301	SL54LS301
S54LS352	SL54LS352
S54LS353	SL54LS353
S54LS363	SL54LS363
S54LS364	SL54LS364
S54LS365A	SL54LS365A
S54LS366A	SL54LS366A
S54LS367A	SL54LS367A
S54LS368A	SL54LS368A
S54LS373	SL54LS373
S54LS374	SL54LS374
S54LS375	SL54LS375
S54LS377	SL54LS377
S54LS378	SL54LS378
S54LS390	SL54LS390
S54LS393	SL54LS393

Original P/N	Lansdale P/N
S54LS395A	SL54LS395A
S54LS445	SL54LS445
S54LS490	SL54LS490
S54LS533	SL54LS533
S54LS534	SL54LS534
S54LS540	SL54LS540
S54LS541	SL54LS541
S54LS569A	SL54LS569A
S54LS620	SL54LS620
S54LS621	SL54LS621
S54LS622	SL54LS622
S54LS623	SL54LS623
S54LS640	SL54LS640
S54LS640-1	SL54LS640-1
S54LS641	SL54LS641
S54LS641-1	SL54LS641-1
S54LS642	SL54LS642
S54LS642-1	SL54LS642-1
S54LS645	SL54LS645
S54LS645-1	SL54LS645-1
S54LS670	SL54LS670
N74LS00	SL74LS00
N74LS01	SL74LS01
N74LS02	SL74LS02
N74LS04	SL74LS04
N74LS05	SL74LS05
N74LS08	SL74LS08
N74LS09	SL74LS09
N74LS10	SL74LS10
N74LS11	SL74LS11
N74LS13	SL74LS13
N74LS14	SL74LS14
N74LS20	SL74LS20
N74LS21	SL74LS21
N74LS26	SL74LS26
N74LS27	SL74LS27
N74LS30	SL74LS30
N74LS32	SL74LS32
N74LS33	SL74LS33
N74LS37	SL74LS37
N74LS38	SL74LS38
N74LS40	SL74LS40
N74LS42	SL74LS42
N74LS51	SL74LS51
N74LS54	SL74LS54
N74LS73	SL74LS73
N74LS74A	SL74LS74A
N74LS75	SL74LS75
N74LS76	SL74LS76
N74LS83A	SL74LS83A
N74LS85	SL74LS85
N74LS86	SL74LS86
N74LS90	SL74LS90
N74LS92	SL74LS92
N74LS93	SL74LS93
N74LS95B	SL74LS95B
N74LS96	SL74LS96
N74LS107	SL74LS107
N74LS109	SL74LS109
N74LS112	SL74LS112
N74LS113	SL74LS113
N74LS125	SL74LS125
N74LS125A	SL74LS125A
N74LS126A	SL74LS126A
N74LS132	SL74LS132
N74LS136	SL74LS136
N74LS138	SL74LS138
N74LS139	SL74LS139
N74LS151	SL74LS151
N74LS153	SL74LS153
N74LS154	SL74LS154
N74LS155	SL74LS155
N74LS156	SL74LS156
N74LS157	SL74LS157
N74LS158	SL74LS158
N74LS160A	SL74LS160A
N74LS161A	SL74LS161A
N74LS162A	SL74LS162A
N74LS163A	SL74LS163A
N74LS164	SL74LS164
N74LS169A	SL74LS169A
N74LS170	SL74LS170
N74LS173	SL74LS173
N74LS174	SL74LS174
N74LS175	SL74LS175
N74LS181	SL74LS181
N74LS191	SL74LS191
N74LS192	SL74LS192
N74LS193	SL74LS193
N74LS194A	SL74LS194A
N74LS197	SL74LS197
N74LS240	SL74LS240
N74LS241	SL74LS241
N74LS242	SL74LS242
N74LS243	SL74LS243
N74LS244	SL74LS244
N74LS245	SL74LS245
N74LS251	SL74LS251
N74LS253	SL74LS253
N74LS256	SL74LS256
N74LS257A	SL74LS257A
N74LS258A	SL74LS258A
N74LS259	SL74LS259
N74LS260	SL74LS260
N74LS266	SL74LS266
N74LS273	SL74LS273
N74LS283	SL74LS283
N74LS295B	SL74LS295B
N74LS298	SL74LS298
N74LS301	SL74LS301
N74LS352	SL74LS352
N74LS353	SL74LS353
N74LS363	SL74LS363
N74LS364	SL74LS364
N74LS365A	SL74LS365A
N74LS366A	SL74LS366A
N74LS367A	SL74LS367A
N74LS368A	SL74LS368A
N74LS373	SL74LS373
N74LS374	SL74LS374
N74LS375	SL74LS375
N74LS377	SL74LS377
N74LS378	SL74LS378
N74LS390	SL74LS390
N74LS393	SL74LS393
N74LS395A	SL74LS395A
N74LS445	SL74LS445
N74LS490	SL74LS490
N74LS533	SL74LS533
N74LS534	SL74LS534
N74LS540	SL74LS540
N74LS541	SL74LS541
N74LS569A	SL74LS569A
N74LS620	SL74LS620
N74LS621	SL74LS621
N74LS622	SL74LS622
N74LS623	SL74LS623
N74LS640	SL74LS640
N74LS640-1	SL74LS640-1
N74LS641	SL74LS641
N74LS641-1	SL74LS641-1
N74LS642	SL74LS642
N74LS642-1	SL74LS642-1
N74LS645	SL74LS645
N74LS645-1	SL74LS645-1
N74LS670	SL74LS670

Schottky TTL

Original P/N	Lansdale P/N
S54S00	SL54S00
S54S02	SL54S02
S54S03	SL54S03
S54S04	SL54S04
S54S05	SL54S05
S54S08	SL54S08
S54S10	SL54S10
S54S11	SL54S11
S54S20	SL54S20
S54S32	SL54S32
S54S37	SL54S37
S54S38	SL54S38
S54S40	SL54S40
S54S51	SL54S51
S54S64	SL54S64
S54S74	SL54S74
S54S85	SL54S85
S54S86	SL54S86
S54S112	SL54S112
S54S113	SL54S113
S54S133	SL54S133
S54S134	SL54S134
S54S135	SL54S135
S54S138	SL54S138
S54S139	SL54S139
S54S140	SL54S140
S54S151	SL54S151
S54S153	SL54S153
S54S157	SL54S157
S54S158	SL54S158
S54S168A	SL54S168A
S54S169A	SL54S169A
S54S172	SL54S172
S54S174	SL54S174
S54S175	SL54S175
S54S181	SL54S181
S54S182	SL54S182
S54S189	SL54S189
S54S194	SL54S194
S54S195	SL54S195
S54S225	SL54S225
S54S240	SL54S240
S54S241	SL54S241
S54S242	SL54S242
S54S243	SL54S243
S54S244	SL54S244
S54S251	SL54S251
S54S253	SL54S253
S54S257	SL54S257
S54S258	SL54S258
S54S260	SL54S260
S54S273	SL54S273
S54S280	SL54S280
S54S301	SL54S301
S54S350	SL54S350
S54S373	SL54S373
S54S374	SL54S374
S54S534	SL54S534

Original P/N	Lansdale P/N
N74S00	SL74S00
N74S02	SL74S02
N74S03	SL74S03
N74S04	SL74S04
N74S05	SL74S05
N74S08	SL74S08
N74S10	SL74S10
N74S11	SL74S11
N74S20	SL74S20
N74S32	SL74S32
N74S37	SL74S37
N74S38	SL74S38
N74S40	SL74S40
N74S51	SL74S51
N74S64	SL74S64
N74S74	SL74S74
N74S85	SL74S85
N74S86	SL74S86
N74S112	SL74S112
N74S113	SL74S113
N74S133	SL74S133
N74S134	SL74S134
N74S135	SL74S135
N74S138	SL74S138
N74S139	SL74S139
N74S140	SL74S140
N74S151	SL74S151
N74S153	SL74S153
N74S157	SL74S157
N74S158	SL74S158
N74S168A	SL74S168A
N74S169A	SL74S169A
N74S172	SL74S172
N74S174	SL74S174
N74S175	SL74S175
N74S181	SL74S181
N74S182	SL74S182
N74S189	SL74S189
N74S194	SL74S194
N74S195	SL74S195
N74S225	SL74S225
N74S240	SL74S240
N74S241	SL74S241
N74S242	SL74S242
N74S243	SL74S243
N74S244	SL74S244
N74S251	SL74S251
N74S253	SL74S253
N74S257	SL74S257
N74S258	SL74S258
N74S260	SL74S260
N74S273	SL74S273
N74S280	SL74S280
N74S301	SL74S301
N74S350	SL74S350
N74S373	SL74S373
N74S374	SL74S374
N74S534	SL74S534

TTL

Original P/N	Lansdale P/N
S8200	SL8200
S8201	SL8201
S8202	SL8202
S8203	SL8203
S8230	SL8230
S8231	SL8231
S8232	SL8232
S8234	SL8234
S8235	SL8235
S8241	SL8241
S8242	SL8242
S8243	SL8243
S8250	SL8250
S8251	SL8251
S8252	SL8252
S8260	SL8260
S8261	SL8261
S8262	SL8262
S8263	SL8263
S8264	SL8264
S8266	SL8266
S8267	SL8267
S8269	SL8269
S8270	SL8270
S8271	SL8271
S8273	SL8273
S8274	SL8274
S8275	SL8275
S8277	SL8277
S8280	SL8280
S8281	SL8281
S8284	SL8284
S8285	SL8285
S8288	SL8288
S8290	SL8290
S8291	SL8291
S8292	SL8292
S8293	SL8293

TTL

Original P/N	Lansdale P/N
S8806	SL8806
S8808	SL8808
S8815	SL8815
S8816	SL8816
S8819	SL8819
S8821	SL8821
S8822	SL8822
S8824	SL8824
S8825	SL8825
S8826	SL8826
S8827	SL8827
S8828	SL8828
S8829	SL8829
S8840	SL8840
S8848	SL8848
S8855	SL8855
S8859	SL8859
S8870	SL8870
S8875	SL8875
S8879	SL8879
S8880	SL8880
S8881	SL8881
S8885	SL8885
S8889	SL8889
S96106	SL96106

INTERFACE

Original P/N	Lansdale P/N
S8H16	SL8H16
S8H20	SL8H20
S8H21	SL8H21
S8H22	SL8H22
S8H70	SL8H70
S8H80	SL8H80

Bipolar Memory

Original P/N	Lansdale P/N
S82LS16	SL82LS16
S82LS181	SL82LS181

Schottky TTL

Original P/N	Lansdale P/N
S82S09	SL82S09
S82S16	SL82S16
S82S19	SL82S19
S82S41	SL82S41
S82S52	SL82S52
S82S62	SL82S62
S82S82	SL82S82
S82S83	SL82S83
S82S212	SL82S212

TTL - Interface

Original P/N	Lansdale P/N
S8T04	SL8T04
S8T05	SL8T05
S8T06	SL8T06
S8T09	SL8T09
S8T10	SL8T10
S8T13	SL8T13
S8T14	SL8T14
S8T15	SL8T15
S8T16	SL8T16
S8T18	SL8T18
S8T20	SL8T20
S8T23	SL8T23
S8T24	SL8T24
S8T26	SL8T26
S8T26A	SL8T26A
S8T28	SL8T28
S8T31	SL8T31
S8T32	SL8T32
S8T33	SL8T33
S8T34	SL8T34
S8T35	SL8T35
S8T36	SL8T36
S8T37	SL8T37
S8T38	SL8T38
S8T80	SL8T80
S8T90	SL8T90
S8T95	SL8T95
S8T96	SL8T96
S8T97	SL8T97
S8T98	SL8T98
S8T125	SL8T125
S8T126	SL8T126
S8T129	SL8T129
S8T245	SL8T245
S8T380	SL8T380
S8T3404	SL8T3404

LSI

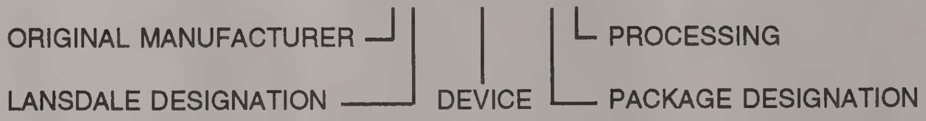
Original P/N	Lansdale P/N
8X41	SL8X41
8X60	SL8X60
8X305	SL8X305
8X350	SL8X350
8X371	SL8X371
8X372	SL8X372
8X376	SL8X376
8X401	SL8X401
8X801	SL8X801
8X801A	SL8X801A

Original P/N	Lansdale P/N
TTL	
S9309	SL9309
S9324	SL9324
S9334	SL9334
S9602	SL9602
LSI	
S9401	SL9401
S9403	SL9403
10K ECL	
10100	SL10100
10101	SL10101
10102	SL10102
10103	SL10103
10104	SL10104
10105	SL10105
10106	SL10106
10107	SL10107
10108	SL10108
10109	SL10109
10110	SL10110
10111	SL10111
10113	SL10113
10114	SL10114
10115	SL10115
10116	SL10116
10117	SL10117
10118	SL10118
10119	SL10119
10121	SL10121
10123	SL10123
10124	SL10124
10125	SL10125
10129	SL10129
10130	SL10130
10131	SL10131
10132	SL10132
10133	SL10133
10134	SL10134
10135	SL10135
10136	SL10136
10137	SL10137
10141	SL10141
10158	SL10158
10159	SL10159
10160	SL10160
10161	SL10161
10162	SL10162
10164	SL10164
10165	SL10165
10171	SL10171
10172	SL10172
10173	SL10173
10174	SL10174
10175	SL10175
10176	SL10176
10179	SL10179
10180	SL10180
10181	SL10181
10188	SL10188
10189	SL10189
10192	SL10192
10210	SL10210
10211	SL10211
10216	SL10216
10231	SL10231
Controller/Peripheral	
SCB68154	SL68154
SCB68155	SL68155
SCB68172	SL68172
TEXAS INSTRUMENTS	
SN54L47	TL54L47

PART MARKING INFORMATION

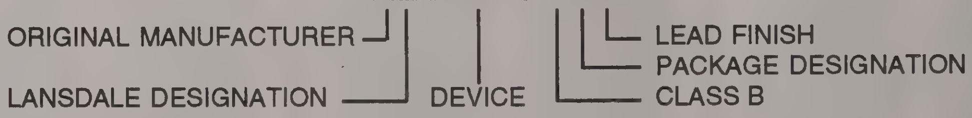
STANDARD PARTS

XL XXXX XX


ORIGINAL MANUFACTURER
LANSDALE DESIGNATION
DEVICE
PROCESSING
PACKAGE DESIGNATION

MIL-STD-883 1.2.1 COMPLIANT PARTS

XL XXXX/ BXX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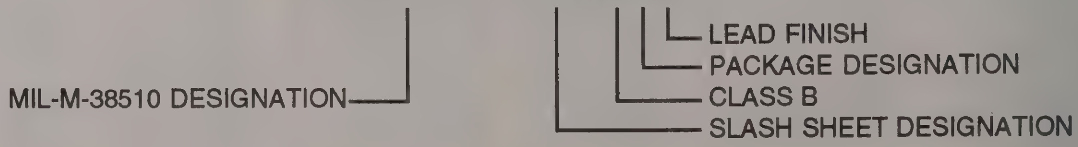
LANSDALE DESIGNATION
DEVICE
LEAD FINISH
PACKAGE DESIGNATION
CLASS B

JAN CLASS B COMPLIANT PARTS

JM38510/ XXXXXBXX


MIL-M-38510 DESIGNATION
LEAD FINISH
PACKAGE DESIGNATION
CLASS B
SLASH SHEET DESIGNATION

LANSDALE
SEMICONDUCTOR, INC.

2929 S. 48th St., Ste. 2
Tempe, AZ 85282
Tele: (602)438-0123
Fax: (602)438-0138

PART MARKING INFORMATION

ORIGINAL MANUFACTURER INFORMATION

A	AMD
F	FAIRCHILD
H	HARRIS
I	INTEL
M	MOTOROLA
N	NATIONAL
R	RAYTHEON
S	SIGNETICS
T	TEXAS INSTRUMENTS

PROCESSING INFORMATION

BLANK	NON BURNED-IN CERAMIC
1	HIGH RELIABILITY CERAMIC
P	COMMERCIAL TEMP. PLASTIC

LEAD FINISH INFORMATION

A	SOLDER DIP
B	MATTE TIN
C	GOLD

PACKAGING INFORMATION

LETTER	DESCRIPTION
A	14-LEAD FLAT PACK (1/4" X 1/4")
B	14-LEAD FLAT PACK (3/16" X 1/4")
C	14-LEAD DUAL INLINE (1/4" X 3/4")
D	14-LEAD FLAT PACK (1/4" X 3/8")
E	16-LEAD DUAL INLINE (1/4" X 7/8")
F	16-LEAD FLAT PACK (1/4" X 3/8")
G	8-LEAD CAN
H	10-LEAD FLAT PACK (1/4" X 1/4")
I	10-LEAD CAN
J	24-LEAD DUAL INLINE (1/2" X 1 1/4")
K	24-LEAD FLAT PACK (3/8" X 5/8")
L	24-LEAD DUAL INLINE (1/4" X 1 1/4")
M	12-LEAD CAN
P	8-LEAD DUAL INLINE (1/4" X 3/8")
Q	40-LEAD DUAL INLINE (9/16" X 2 1/16")
R	20-LEAD DUAL INLINE (1/4" X 1 1/16")
S	20-LEAD FLAT PACK (1/4" X 1/2")
V	18-LEAD DUAL INLINE (1/4" X 15/16")
W	22-LEAD DUAL INLINE (3/8" X 1 1/8")
Y	28-LEAD DUAL INLINE (1/2" X 1 1/2")

LANSDALE
SEMICONDUCTOR, INC.

2929 S. 48th St., Ste. 2
Tempe, AZ 85282
Tel: (602)438-0123
Fax: (602)438-0138

Lansdale manufactures older technology integrated circuits and has complete foundry facilities. Following is a summary of the current product line, showing the original manufacturer and product type.

ORIGINAL MANUFACTURER	PRODUCT	PART NUMBER
AMD	Bipolar Digital	2501, 2506, 2905, 2906, 2915
HARRIS	Bipolar PROM	0512
	Quad Power Strobe	6600
	Monolithic Diode	0168, 0186, 0410, 0104, 0198
	Bipolar PROM	7600 Series
INTEL	Microprocessor	8080A
	Peripherals	8200 Series
	Octal	828X Series
MOTOROLA	SUHL/TTL	400/500 Series
	HTL	660T Series
	RTL	800/900 Series
	DTL	830/930 Series
	Linear	1500 Series/1710
	SUHL/TTL II	2000/2100 Series
	TTL III	3000/3100 Series
	TTL	4000/4300 Series
	SUHL/TTL	5000/5100 Series
	TTL	5400/7400 Series
	TTL III	54H00/74H00 Series
	Super Schottky TTL	54SS00/74SS00 Series
	TTL	7200/8200 Series
	TTL	8300/9300 Series
	CMOS	14000 Series
NATIONAL/FAIRCHILD	PMOS	3300 Series
	PMOS	3262, 2466, 3708, 3844, 3845
RAYTHEON	DTL	200 Series
SIGNETICS	DTL	100, 400, 700 Series
	UTiLOGIC II	300 Series
	DTL	600 Series
	TTL	5400/7400 Series
	Schottky TTL	54S00/74S00 Series
	Low Power Schottky TTL	54LS00/74LS00 Series
	TTL III	54H00/74H00 Series
	TTL - Interface	8T00 Series
	TTL	8200 Series
	Schotty TTL	82S00 Series
	TTL	8800 Series
	TTL - Interface	8H00 Series
	LSI	8X00 Series
	ECL	10100 Series

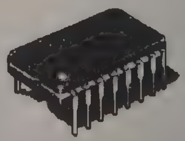
•JAN Class B Certified

•883 1.2.1 Compliant Products Available

•Complete Foundry Service

- Mask Provided

-Custom, Semi-custom



•Reverse Engineering Available

•Dedicated to TQC

COMPANY ACQUISISTIONS, MERGERS & CHANGES

Former Name	**New Name**
Fairchild Semiconductor	*Now part of* National Semiconductor
Ferranti Interdesign	Custom Arrays Corporation
Gazelle Semiconductor	Triquint Semiconductor *(merged)*
GE, RCA and Intersil	*ICs available from* Harris Corporation
General Instrument Microelectronics Division	Microchip Technology
Gould AMI	American Microsystems Inc.
Harris Microwave Semiconductor	Samsung Microwave Semiconductor
Honeywell Semiconductors	Signal Processing Technologies
Hybrid Systems Corporation	Sipex Corporation *(merged)*
Inova	*No longer in business*
Integrated CMOS Systems	Vertex Semiconductor
Intersil	*See* GE
Lambda Semiconductor	*ICs available from* Semtech Corporation
Monolithic Memories, Inc. (MMI)	*Now part of* Advanced Micro Devices
Mostek Semiconductors	*Now part of* Thomson-CSF
Plus Logic	*Now part of* Xilinx
Precision Monolithics Inc. (PMI)	*Now part of* Analog Devices
RCA	*See* GE
RIFA	Ericsson Components
Scorpion	MSI/Scorpion
Silicon General	Linfinity Microsystems
Sprague Semiconductor	Allegro Microsystems
TRW LSI Products	Raytheon-LaJolla
ZAXTEK	Zax Corp.

Extra-custom™ VS Other-custom

Extra-custom **is our Analog and Digital Full-Custom Service providing *EXTRA* benefits not available with any *OTHER* custom service.**

Extra Benefit #1
You get a complete turnkey solution for your custom IC needs. Your engineers are not tied up doing IC and test program design. We do all the work using State-of-the-Art CAE/CAD for circuit design, schematic capture, simulation, layout and verification of the custom IC and advanced ATE to 100% test each IC.

Extra Benefit #2
Your system integration is maximized because we take the trouble to completely understand your system. Using our system and circuit design expertise, we innovate solutions to include all the ANALOG and DIGITAL functions which can be integrated. (We can help with your system design too.)

Extra Benefit #3
Your circuit design and layout are optimized to reduce function area, interconnect and pin count. This minimizes unit price and maximizes performance and reliability.

Extra Benefit #4
You are offered the LSI process which is best suited for your application. We can do this because we purchase wafer fabrication from foundries with a broad range of process capabilities.

Extra Benefit #5
Your production is multi-sourced at every step of the manufacturing process. Masks, wafer fabrication and assembly are each procured from several reliable sources, ensuring on-time production deliveries.

Extra Benefit #6
You have the ultimate in proprietary protection for your product design. Your competition sees what your product does, but with a proprietary Extra-custom IC working for you, they won't be able to easily decipher technique, or compete with your manufacturing cost.

Extra Benefit #7
You receive quality service in every aspect of the custom circuit's development and production. We provide the support required to guarantee your product's success.

Extra Benefit #8
You have our experience working for you. We have been satisfying demanding, high volume custom circuit requirements since 1969.

A Special version of our *Extra-custom* service . . . .

When you need a special IC and don't need proprietary rights, our Special-custom service gives you what you need. You get the benefits of our Extra-custom service, except for exclusivity, and save on development and production costs. *Call for details.*

Talk to us!
We want to be your IC supplier.

LSI/CSI

LSI COMPUTER SYSTEMS, INC
1235 Walt Whitman Road, Melville, NY 11747-3086
Telephone (516) 271-0400 FAX (516) 271-0405

PROGRAMMABLE DIGITAL DELAY TIMER

LS7210 (14 Pin DIP)

Programmable Digital Delay Timer

- Generates delays from milliseconds to "infinity"
- Delays programmed by 5 Binary Weighted inputs and input frequency
- External clock or external RC at oscillator port sources input frequency
- Four selectable Operating Modes:

DUAL DELAY	DELAYED OPERATE
ONE-SHOT	DELAYED RELEASE

- 4.75V to 15V operation

DIVIDERS

RED SERIES (8 Pin DIP)

50Hz/60Hz CMOS Time Base Generators

- Frequency division of 50 Hz/60 Hz sine waves
- 50 Hz/60 Hz DIVISION SELECT input
- RESET and ENABLE input controls
- CLOCK input shaping network can interface directly with 50Hz/60Hz AC Line through an external current limiting resistor
- 4.5V to 15V operation
- Available Dividers:
  5/6, 50/60, 100/120, 300/360, 500/600, 3000/3600

RDD 104 (8 Pin DIP)

Selectable Four Decade CMOS Divider

- Divides by 10, 100, 1000 or 10,000
- DIVISION SELECT determined by state of two inputs
- RESET input
- External Clock or external Crystal across active oscillator network sources input frequency
- 4.5V to 15V operation

COUNTERS

LS7030 (40 Pin DIP)

Eight Decade Up Counter

- DC to 10 MHz Count Frequency
- Multiplexed BCD and 7 Segment data outputs
- Leading Zero Blanking output
- Decimal Point and Overflow control inputs
- On-chip Scan Oscillator
- 4.75V to 15V operation

LS7031 (40 Pin DIP)

Six Decade Up Counter with Eight Decade Latch

- DC to 10 MHz Count Frequency
- Multiplexed BCD data outputs
- Access to the two LSD latches allows attachment of external prescalers for counting to 1 GHz
- Leading Zero Blanking output
- Decimal Point and Overflow control inputs
- On-chip Scan Oscillator
- 4.75V to 15V operation

COUNTERS (cont'd)

LS7040 (40 Pin DIP)

Dual Three Decade Up/Down Counter

- DC to 350 KHz Count Frequency
- Fully Synchronous counting
- Cascadable
- Parallel BCD outputs
- Separate Reset and Enable control inputs for each three decade counter
- 4.75V to 15V operation

LS7055-LS7056 (40 Pin DIP)

Six Decade Pre-Determining Up/Down Counter

- DC to 250 KHz Count Frequency
- Fully Synchronous counting
- Multiplexed BCD and 7 Segment data outputs
- Preset, Presignal and Mainsignal Storage Registers
- Three Comparators with Output Flags
- Thumbwheel interface for loading registers
- On-chip Scan Oscillator
- 4.75V to 15V operation

LS7060/LS7062 (18 Pin DIP)

32-Bit/Dual 16-Bit Binary Up Counter

- DC to 15 MHz Count Frequency
- Byte multiplexed Three-State data outputs
- Unique Cascade Feature allows data bytes from many counters to be sequentially multiplexed to the output bus in a Multiple Counter System
- 32-bit latch
- 4.75V to 5.25V operation

LS7061/LS7063 (24 Pin DIP)

32-Bit/Dual 16-Bit Binary Up Counter

- Same features as LS7060/LS7062 except there is a 40-bit latch instead of 32-bit latch
- Ability to latch external eight bits allows attachment of external prescaler for counting to 3.84 GHz

LS7166 (20 Pin DIP)

24-Bit Multi-Mode Counter

- DC to 20 MHz Count Frequency
- 8-bit I/O bus for Microprocessor communication and control
- Programmable modes are: Up/Down, Binary, BCD, 24 Hour Clock, Divide-by-N, Single Cycle, and X1, X2 and X4 Quadrature
- 24-bit comparator for preset count comparison
- TTL and CMOS compatible
- 4.5V to 5.5V operation

QUADRATURE PULSE DECODERS

LS7082 (14 Pin DIP)

Quadrature Clock Converter

- Interface for Optical or Magnetic Encoder signals to standard UP/DOWN Counters
- On-chip filtering of Quadrature Clocks
- X1, X2 and X4 mode selection
- Up to 16 MHz Output Clock Frequency
- Adjustable output clock pulse width
- UP/DOWN count control output
- INDEX input and output
- TTL and CMOS compatible

LS7083/LS7084 (8 Pin DIP)

Quadrature Clock Converters

- Same features as LS7082 except no X2 mode and no INDEX input and output
- LS7083 Outputs: UP CLOCK and DOWN CLOCK
- LS7084 Outputs: CLOCK and UP/DOWN count control

LIGHTING CONTROLS

LS7231-LS7234 (8 Pin DIP)

Touch Control Continuous Dimmer Light Switch

- Touch or mechanical switch SENSE input control
- Momentary SENSE input activation causes ON/OFF switching
- Prolonged SENSE input activation causes variable dimming operation
- Brightness Memory and Dimming Direction Reverse features depending on Part Number
- DOZE input for external control of DIM-TO-OFF time
- SLAVE input for control by Remote Extension

LS7237 (8 Pin DIP)

Touch Control Step Dimmer Light Switch

- Touch or mechanical switch SENSE input control
- MODE input selects 1, 3, or 4 level Brightness Sequence
- SLAVE input for control by Remote Extension

LS7331(14 Pin DIP)

Touch Control Continuous Dimmer Light Switch with Interface Signals for Microprocessor Control

- Same features as the LS7231
- Light Status outputs allow for Microprocessor control

LS7338 (8 Pin DIP)

Touch Control Light Switch with Timed-ON and Delayed-OFF Modes

- Touch or mechanical switch SENSE input control
- Operating Sequence: TIMED-ON —> DELAYED-OFF —> OFF
- Manual or Automatic Sequence Advance
- External RC controls Timed-On period
- Transition from Timed-On mode to Delayed-Off mode indicated by reduction of light brightness
- Light DIMS-TO-OFF during the programmed Delayed-Off period

LS7339-LS7340 (8 Pin DIP)

Touch Control ON-OFF Light Switch with Retriggerable Timed-ON Mode.

- Touch or mechanical switch ON and OFF input controls
- External RC controls Timed-On period
- On period timer retriggers with each activation of ON input

LIGHTING CONTROLS (cont'd)

LS7314-LS7315 (16 Pin DIP)

Touch Control Multi-Level Light Switch

- Touch or mechanical switch input controls
- Up to ten selectable BRIGHTNESS LEVEL inputs
- A selected BRIGHTNESS LEVEL input becomes an output which can drive an LED to indicate the selected Brightness

LS7534-LS7535 (8 Pin DIP)

Touch Control Dimmer Light Switch with Up and Down Control

- Touch or mechanical switch UP and DOWN input controls
- Momentary UP/DOWN input activation cause ramping to MEMORY ON/OFF states
- Prolonged UP/DOWN input activation cause variable dimming operation towards MAX/MIN Brightness Levels
- DOZE input for external control of DIM-TO-OFF time

BRUSHLESS DC MOTOR CONTROLS

LS7260-LS7262 (20 Pin DIP)

Brushless DC Motor Commutator/Controller

- Open or closed loop control of 3 and 4 phase motors
- HALL SENSOR inputs control output commutation sequence for electrical sensor spacings of 60°, 120°, 240°, or 300°
- Speed controlled by Pulse Width Modulation of output drivers
- Control inputs include ANALOG SPEED, FORWARD/REVERSE OUTPUT ENABLE and POSITIVE STATIC BRAKING
- OVERCURRENT SENSING disables output drivers
- Direct drive of FETs (LS7260) and Bipolar Transistors (LS7261/ LS7262)
- Controls Brush DC Motors in "H-Bridge" configuration
- 5V to 28V operation

LS7362 (20 Pin DIP)

Brushless DC Motor Commutator/Controller

- Same features as LS7262 except Pulse Width Modulation occurs only in low-side drivers allowing use with High-Voltage motors

LS7263 (18 Pin DIP)

Three Phase Brushless DC Motor Speed Controller

- Regulates speed to +/- 0.1% accuracy for 3600 RPM applications
- 3.58 MHz crystal time base
- Other speeds accommodated with modified ROM and crystal frequency
- Rapid acceleration to speed
- Positive Static Braking
- Overcurrent Sensing
- Low Speed Detection output
- Direct drive of Bipolar Transistors
- 10V to 28V operation

LS7264 (16 Pin DIP)

Four Phase Brushless DC Motor Speed Controller

- Same features as LS7263 except as shown below
- 2.4576 MHz crystal time base
- Forward/Reverse control input

AC MOTOR CONTROLS

LS7237(8 Pin DIP)

AC Motor Sequential Step Speed Controller

- Controls speed of small AC motors
- Touch or mechanical switch input control
- MODE input selects 1, 3, or 4 step speed sequence

LS7310-LS7313(18 Pin DIP)

Multi-Level AC Motor Speed Controllers

- Touch or mechanical switch input controls
- Up to ten selectable SPEED LEVEL inputs
- A selected SPEED LEVEL input becomes an output which can drive an LED to indicate the selected speed
- ON, OFF and PULSE control inputs

LS7314-LS7315 (16 Pin DIP)

Multi-Level AC Motor Speed Controller

- Same features as LS7310-LS7313 except there are no ON and PULSE control inputs

LS7339-LS7340 (8 Pin DIP)

On-Off AC Motor Control with Retriggerable Timed-On Mode

- Touch or mechanical switch input controls
- External RC controls Timed-On period
- On period timer retriggers with each application of ON input
- Applications include Auto Shut-Off appliance timers

DYNAMIC SCATTERING LIQUID CRYSTAL DISPLAY DRIVERS

LS7100 (16 Pin DIP)

BCD TO 7 Segment Latch/Decoder/Driver

- Drives Dynamic Scattering Liquid Crystal Displays
- Up to 50V drive per segment output
- 5V to 60V operation
- BLANKING and LOAD input controls
- Inputs are TTL and CMOS compatible

LS7110 (16 Pin DIP)

Binary Addressable Latched Eight Channel Demultiplexer/Driver

- Drives Dynamic Scattering Liquid Crystal Displays
- Up to 50V drive per output
- 5V to 60V operation
- ADDRESS and LOAD input controls
- Inputs are TTL and CMOS compatible

MASK PROGRAMMABLE MELODY GENERATORS

LS3404-XX (8 Pin DIP)

High Quality Melody Circuits

- Produces chime quality musical sound
- 255 note capacity Mask-Programmable ROM
- Excellent pitch resolution
- Exponential decay imposed on each note
- Direct drive of Piezo Transducer
- Single transistor interface for standard speaker
- 4.5V to 15V operation
- Thirty-one programmed melodies available

PROGRAMMABLE DIGITAL LOCKS

LS7220 (14 Pin DIP)

Automotive Ignition Digital Lock Circuit

- 5,040 four digit Combinations (for a 10 number keypad)
- Combinations are hard-wire programmed
- SENSE input enables chip operation
- Save Memory feature saves Unlock Condition for Valet Parking
- SAVE input sets Save Memory and LOCK input resets SAVE Memory
- Save Memory and Lock Status outputs
- Convenience Delay determined by external capacitor
- Static or Momentary Lock Control output

LS7222-LS7223 (20 Pin DIP)

Keypad Programmable Digital Lock Circuit

- 38,416 four digit Combinations (for a 4 x 4 keypad matrix)
- 3 different user programmable codes
- LS7222 Programmable Codes: Arm, Disarm, Duress
- LS7223 Programmable Codes: Lock 1, Lock 2, Duress
- Lock and Program Status Outputs
- Static and Momentary Lock Control outputs
- Alarm and Tamper Detection outputs

LS7225-LS7226 (14 Pin DIP)

Machine or Area Access Digital Lock Circuit

- 5,040 four digit Combinations (for a 10 number keypad)
- Combinations are hard-wire programmed
- SEQUENCE ENABLE input enables Combination Entry
- Combination Entry time controlled by external capacitor
- Static and Momentary Lock Control outputs
- Tamper Detection output
- Lock Status output

LS7228-LS7229 (16 Pin DIP)

Serial Address Decoder/ 2 Pushbutton Digital Lock Circuit

- 512 nine bit Combinations
- Combinations are hard-wire programmed
- LS7228: Dual pulse train input combination entry
- LS7229: Two pushbutton input combination entry
- Static or Momentary Lock Control output
- Code bit-entry time controlled by external capacitor

TELEPHONE LINE CONTROLS

LS75XX (16 Pin DIP)

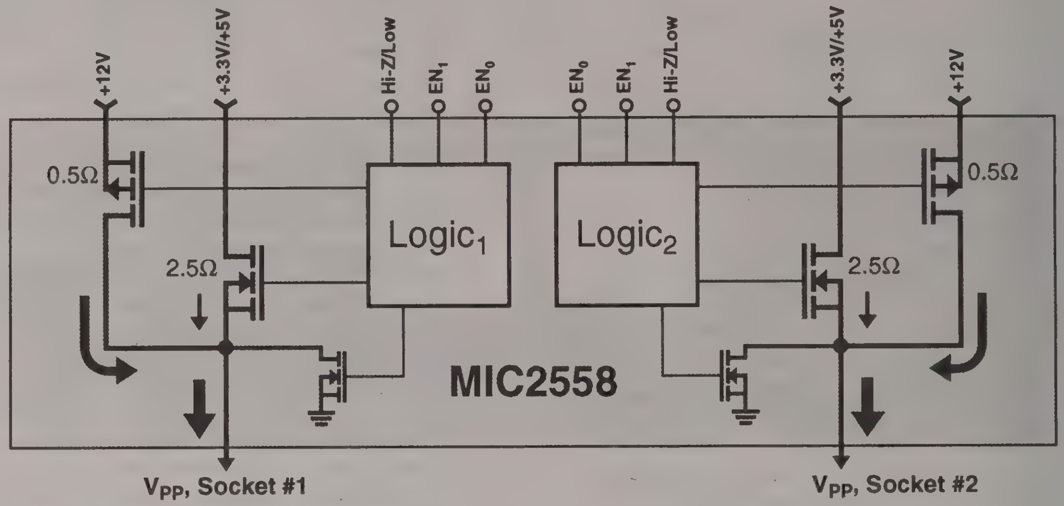
Tone Activated Telephone Line Switch Controllers

- Circuit activated by Tone with specific Frequency and Time Duration
- Frequency and Time Duration values are mask programmable
- Small Signal (as low as - 30 DBM) and Digital Level Tone signals accommodated.
- On-chip active oscillator network and 32,768 Hz Crystal generates timing.
- Low power consumption
- 2.5V to 6V operation.
- Ten programmed frequencies available.
- Applications include Remote Telephone Line Testing, Remote Meter Reading, and Security System Auto-Dialers

MICREL

PCMCIA Power Control

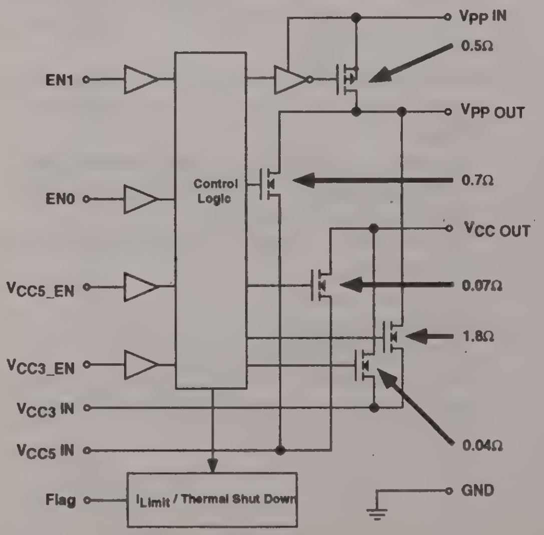
Micrel is the world leader in PCMCIA power switching.

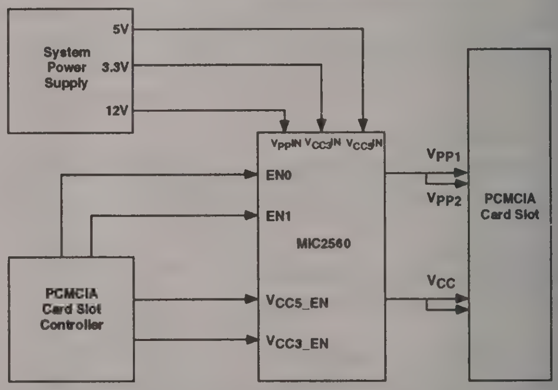

+12V
+3.3V/+5V
Hi-Z/Low
EN1
EN0
EN0
EN1
Hi-Z/Low
+3.3V/+5V
+12V
0.5Ω
2.5Ω
Logic1
Logic2
0.5Ω
2.5Ω
MIC2558
VPP, Socket #1
VPP, Socket #2

The Industry-Standard MIC2557/2558 V_{pp} Switching Matrix

The NEW, High Performance, Fully Protected MIC2560 V_{CC}/V_{PP} Switching Matrix

- Provides *ALL* PCMCIA power control functions
- Up to 1A of V_{cc} output (5V and/or 3.3V)
- Up to 200mA of V_{pp} output (12V, 5V, or 3.3V)
- Full protected
  - –Over-current protection
  - –Over-temperature protection
- Easy to use–No external components required
- Error Flag for fault detection
- Controlled switching waveform


Vpp IN
0.5Ω
EN1
VPP OUT
0.7Ω
EN0
Control Logic
VCC OUT
VCC5_EN
0.07Ω
1.8Ω
VCC3_EN
VCC3 IN
VCC5 IN
0.04Ω
Flag
ILimit / Thermal Shut Down
GND


System Power Supply
5V
3.3V
12V
VppIN VCC3IN VCC5IN
EN0
EN1
MIC2560
VCC5_EN
VCC3_EN
VPP1
VPP2
VCC
PCMCIA Card Slot
PCMCIA Card Slot Controller

MIC2560 Typical Application. The MIC2560 provides complete power switching for your PCMCIA solot.

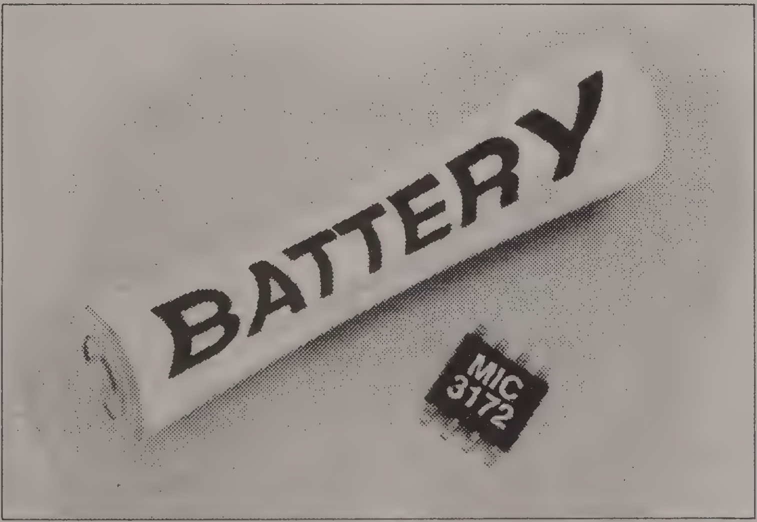
PCMCIA
PC Card
MEMBER COMPANY

MICREL INC. 1849 FORTUNE DRIVE, SAN JOSE CA 95131 TEL (408) 944–0800 FAX (408) 944–0970

MICREL

Switching Regulators

Device	Input Voltage Range	Preferred Topology	Maximum Input Current	Control Mode	Maximum Frequency	Features				Package
						Front Edge Blanking	Shut-down	Over Current Shutdown / Current Limit	Thermal Protection	
MIC2172 3.3, 5.0, 12, 15	3V to 40V	Boost	1.25A	Current	100kHz			•	•	SOIC P-DIP CerDIP
MIC3172 3.3, 5.0, 12, 15	3V to 40V	Boost	1.25A	Current	100kHz		•	•	•	
LM2574 3.3, 5.0, 12, 15	4V to 40V	Buck	0.5A	Voltage	52kHz		•	•	•	SOIC TO-263 P-DIP
LM1575/ 2575 3.3, 5.0, 12, 15	4V to 40V	Buck	1A	Voltage	52kHz		•	•	•	TO-3 TO-220 TO-263 P-DIP SOIC
LM1576/ 2576 3.3, 5.0, 12, 15	4V to 40V	Buck	3A	Voltage	52kHz		•	•	•	TO-3 TO-220 TO-263 P-DIP SOIC
MIC18xC42/ 43/44/45 **MIC38xC42/ 43/44/45**	8V to 18V	Buck or Boost	1A	Current	500kHz			•		P-DIP CerDIP SOIC
MIC3830/ 31/32/33	8V to 21V	Current-Fed	—	Current or Voltage	500kHz	•	•	•		P-DIP CerDIP SOIC
MIC631/2/3 3.3, 5.0, 12, 15	2V to 16.5V	Boost	450mA	Hysteretic	50kHz				•	P-DIP CerDIP SOIC
MIC641/2/3 3.3, 5.0, 12, 15	2V to 16.5V	Boost	Limited by external MOSFET	Hysteretic	50kHz				•	P-DIP CerDIP SOIC



Stretch your system's battery life with Micrel regulators!

MICREL INC. 1849 FORTUNE DRIVE, SAN JOSE CA 95131 TEL (408) 944–0800 FAX (408) 944–0970

MICREL

Low Drop-out Linear Regulators

Device	V_{OUT} 3.0	3.3	4.8	5.0	12	15	Adjust.	Accuracy	I_{OUT} (mA)	Dropout Voltage @ I (Max. @ 25°C)	I_{LIM}	Therm Protect	Error Flag	Logic Control	Reverse Supply	Load Dump	Package
MIC5200	•	•	•	•				1.0%	100	450mV	•	•		•	•		SO-8, SOT-223
MIC5202 dual	•	•	•	•				1.0%	100	450mV	•	•		•	•		SO-8
LP2950				•				0.5% 1.0%	100	450mV @ 100mA	•	•					TO-92
LP2951							1.2 to 29	0.5% 1.0%			•	•	•	•			P DIP, Cer DIP, SO-8
MIC2950				•				0.5% 1.0%	150	300mV @ 100mA	•	•			•	•	TO-92
MIC2951							1.2 to 29	0.5% 1.0%			•	•	•	•	•	•	P DIP, CerDIP, SO-8
MIC5201	•	•	•	•				1.0%	200	450mV	•	•		•	•		SO-8, SOT-223
MIC2954				•			1.2 to 29	0.5% 1.0%	250	500mV @ 250mA	•	•	•	•	•	•	TO-92, TO-220 SOT-223, SO-8
MIC2920A		•	•	•	•			1.0%	400	450mV @ 250mA 370mV typ.	•	•			•	•	TO-220, SOT-223
MIC29201		•	•	•	•						•	•	•	•	•	•	TO-220-5, TO-263-5
MIC29202							1.2 to 26				•	•		•	•	•	TO-220-5, TO-263-5
MIC29203							1.2 to 26				•	•	•		•	•	TO-220-5, TO-263-5
MIC29204							1.2 to 26				•	•	•	•	•	•	P DIP, CerDIP, SO-8
MIC2937A		•	•	•	•	•		1.0%	750	450mV @ 500mA 325mV typ	•	•			•	•	TO-220, TO-263
MIC29371		•	•	•	•	•					•	•	•	•	•	•	TO-220-5, TO-263-5
MIC29372							1.2 to 26				•	•		•	•	•	TO-220-5, TO-263-5
MIC29373							1.2 to 26				•	•	•		•	•	TO-220-5, TO-263-5
MIC2940A		•	•	•	•			1.0%	1250	450mV	•	•			•	•	TO-3, TO-220, TO-263
MIC2941A							1.2 to 26				•	•		•	•	•	TO-3, TO-220-5, TO-263-5
MIC29150		•	•	•	•			1%	1.5A	450mV	•	•			•	•	TO-220, TO-263, TO-3
MIC29151		•	•	•	•			1%	1.5A	450mV	•	•	•	•	•	•	TO-220, TO-263, TO-3
MIC29152							•	1%	1.5A	450mV	•	•		•	•	•	TO-220, TO-263
MIC29153							•	1%	1.5A	450mV	•	•	•		•	•	TO-220, TO-263
MIC29300		•	•	•	•			1%	3A	450mV	•	•			•	•	TO-220, TO-263, TO-3
MIC29301		•	•	•	•			1%	3A	450mV	•	•	•	•	•	•	TO-220, TO-263, TO-3
MIC29302							•	1%	3A	450mV	•	•		•	•	•	TO-220, TO-263
MIC29303							•	1%	3A	450mV	•	•	•		•	•	TO-220, TO-263
MIC29500		•	•	•	•			1%	5A	450mV	•	•			•	•	TO-220, TO-263, TO-3
MIC29501		•	•	•	•			1%	5A	450mV	•	•	•	•	•	•	TO-220, TO-263, TO-3
MIC29502							•	1%	5A	450mV	•	•		•	•	•	TO-220, TO-263
MIC29503							•	1%	5A	450mV	•	•	•		•	•	TO-220, TO-263
MIC29750		•	•	•	•			1%	7.5A	450mV	•	•			•	•	TO-3
MIC29751		•	•	•	•			1%	7.5A	450mV	•	•	•	•	•	•	TO-3
MIC29752							•	1%	7.5A	450mV	•	•		•	•	•	TO-3
MIC29753							•	1%	7.5A	450mV	•	•	•		•	•	TO-3
MIC5156		•		•	•		•	1%	①	①	•		•	•			P DIP, CerDIP
MIC5157		②		②	②			1%	①	①	•		•	•			
MIC5158				③			③	1%	①	①	•		•	•			

① Max. I_{OUT} and dropout determined by choice of external MOSFET

② Selectable: 3.3V/5V/12V

③ Selectable: 5V/adjustable

MICREL INC. 1849 FORTUNE DRIVE, SAN JOSE CA 95131 TEL (408) 944–0800 FAX (408) 944–0970

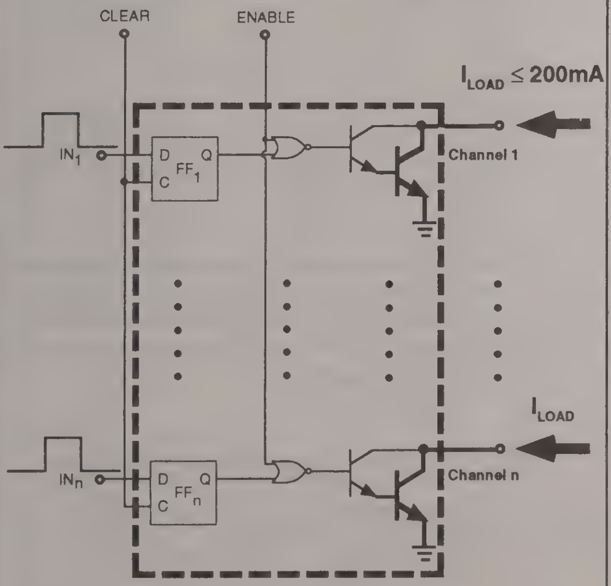
Latched Drivers

All Micrel Latched Drivers are available in die form. Special package options available on most latched drivers: please contact factory for details.

Latched Driver	Maximum Voltage	I_{OUT}	Transient Protection	Temp Range*	Package
MIC4807 Protected Addressable Low Side Driver	80V	200mA	Diode	A,B	CerDIP, PDIP
MIC5800 4 Bit Parallel Input	50V	500mA	Diode	A,B	CerDIP, PDIP, SOIC
MIC5801 8-Bit Parallel Input	50V	500mA	Diode	A,B,C	CerDIP, PDIP, SIP
MIC58P01 8-Bit Parallel, Protected	80V	500mA	Diode	A,B	CerDIP, PDIP
MIC59P50 8-Bit Parallel, Protected	80V	500mA	Diode	A,B	CerDIP, PDIP
MIC5821 8-Bit Serial Input	50V	500mA	—	A,B,C	CerDIP, PDIP
MIC5822 8-Bit Serial Input	80V	500mA	—	A,B	CerDIP, PDIP
MIC5841 8-Bit Serial Input	50V	500mA	Diode	A,B	CerDIP, PDIP, SOIC, PLCC
MIC5842 8-Bit Serial Input	80V	500mA	Diode	A,B	CerDIP, PDIP, SOIC, PLCC
MIC58P42 8-Bit Serial, Protected	80V	500mA	Diode	A,B	CerDIP, PDIP, SOIC, PLCC
MIC59P60 8-Bit Serial, Protected	80V	500mA	Diode	A,B	CerDIP, PDIP, SOIC, PLCC

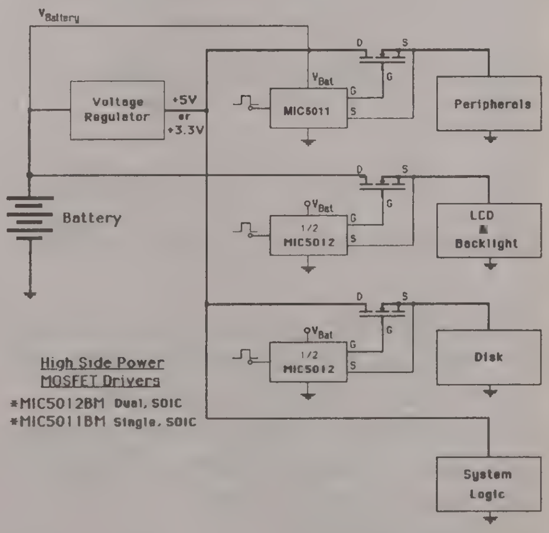
* A = –55°C to +125°C, B = –40°C to +85°C, C = 0°C to +70°C.

Latched Power Switching


CLEAR
ENABLE
I_{LOAD} ≤ 200mA
IN_1
D
Q
C
FF_1
Channel 1
I_{LOAD}
IN_n
D
Q
C
FF_n
Channel n

MIC5800/5801 Parallel Input Latched Drivers
MIC5821/5822, MIC5841/42 Serial Input Latched Drivers
4 or 8 Channels

Laptop Computer Power Management


$V_{Battery}$
Voltage Regulator
+5V or +3.3V
Battery
V_{Bat}
MIC5011
D
S
G
Peripherals
1/2 MIC5012
LCD & Backlight
Disk
System Logic
High Side Power MOSFET Drivers
*MIC5012BM Dual, SOIC
*MIC5011BM Single, SOIC

Achieve greater battery life in laptop computer applications with high-efficiency power switching using MIC5010-series High-side power MOSFET drivers.

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MICREL

Micrel Power MOSFET Drivers

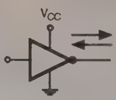
Micrel Features the industry's broadest line of Power MOSFET drivers.

From the blindingly fast MIC4451 family of low side drivers to the full featured MIC5010/20 family of high and low side drivers, Micrel can truly claim "*One family drives all FETs*"

Why use N-Channel Power MOSFETs?

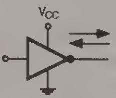
Price! That's why! Compared to P-Channel devices, the N-Channel MOSFET costs far less- - one-third to one-half of the PMOS price. What do you get for that 2.5X surcharge? Some say ease of high-side driving. But with the Micrel MIC5010 family, this argument no longer holds true. The low cost MIC5014 provides high performance high-side or low-side switching with low power dissipation and extremely low (CMOS compatible) drive requirements. The MIC5021 provides a current sense function that automatically protects the MOSFET when an overcurrent situation occurs. All this ease-of-design and expanded functionality is inherent with a N-Channel power MOSFET paired with a Micrel MOSFET driver, and at a cost less than just the PMOS pass device.

Low Side



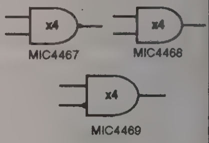
MIC426/1426/4426 and MIC4423 Families

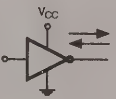
- Two High Current Drivers in a 8-pin Package
- 1.2A to 3A Peak Drive capability (each half)
- Surface mount available



MIC4467/4468/4469

- Quad 1.2A MOSFET drivers
- Latch-up protected
- Three logic choices
- Surface mount available


x4
MIC4467
x4
MIC4468
x4
MIC4469



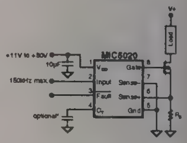
MIC4420/4421 and MIC4451 Families

- Largest MOSFET drive available
- 6A to 12A of Peak Drive capability
- Latch-up protected
- Drives 100,000pF MOSFETs or IGBTs
- Available in a variety of packages, including the 8-pin surface mount

High or Low Side

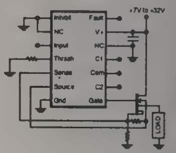
MIC5020

- Low power, fully protected driver
- Programmable overcurrent shutdown
- Internal charge pump
- Surface mount available


V+
Load
+11V to +80V
10µF
MIC5020
150kHz max
optional
Gate
Input
Sense-
Fault
Sense+
Gnd

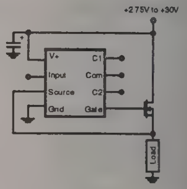
MIC5010

- Full featured predriver
- Optional speed-up capacitors
- Wide supply range
- Internal charge pump
- Over-current sensing with error flag
- Surface mount available


+7V to +32V
Inhibit
Fault
NC
V+
Input
NC
Thresh
C1
Sense
Com
Source
C2
Gnd
Gate
LOAD

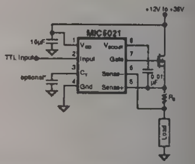
MIC5014/5015/5016/5017

- Internal charge pump
- 2.75V to 30V supply
- Minimum parts count
- "Load dump" protected
- Surface mount available


+2.75V to +30V
V+
C1
Input
Com
Source
C2
Gnd
Gate
Load

MIC5021

- Internal charge pump
- High speed high side driver
- Programmable overcurrent shutdown
- Surface mount available


+12V to +36V
MIC5021
10µF
TTL Input
optional
Input
Gate
Sense-
Sense+
Gnd
Load

Micrel's Product Line:

- **High-Current Low-Side MOSFET Drivers**
- **High Side Power MOSFET Drivers**
- **Low Drop-out Linear Regulators**
- **High Efficiency Switching Regulators**
- **PCMCIA Power Control Matrices**
- **Power Latched Drivers**
- **Display Drivers**
- **P-Channel MOSFETs**
- **Open Drain Power Switches**

For your FREE copy of MICREL's full-line Data Book or for the name of your local representative or distributor, please contact:

Micrel Semiconductor
1849 Fortune Drive
San Jose, CA 95131

Phone: (408) 944–0800
FAX: (408) 944-0970

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MICRO NETWORKS

nsai
I.S./ISO 9001/EN 29001

Micro Networks, a division of Unitrode Corporation, is an established world leader in the design, development and manufacturing of high-performance data conversion products for military/aerospace and industrial applications. Our military data conversion products are manufactured in accordance with the requirements of MIL-STD-883, Method 5008 in our MIL-STD-1772 Qualified Facility. This qualification also enables us to participate in DESC's Standardized Military Drawing (SMD) Program. Micro Networks has also been granted "Registered Firm" status under IS/ISO 9001/EN29001, which complements our existing TQM (Total Quality Management) and SPC (Statistical Process Control) Programs. Additionally, we extend the high-performance and reliability of our military products to fulfill the demanding requirements found in the high-end industrial marketplace. The following selection guides represent our complete data converter and standard precision oscillator product offerings from Micro Networks.

- **Analog to Digital Converters**
- **Digital to Analog Converters**
- **Sampling A/D Converters**
- **Track-Hold Amplifiers**
- **Data Acquisition Systems**
- **CMOS Flash A/D Converters**
- **Precision Oscillators**
- **V/F Converters**
- **Custom Hybrids**

Sampling Analog-to-Digital Converters

Resolution	Model Number	Input Voltage Range		Specified Temperature Range (°C)	Minimum Sampling Rate	Minimum Input Bandwidth	SNR	Harmonics	DIP Pkg.	DESC SMD (5962-)
		Unipolar	Bipolar							
16-Bits	MN6500	0 to +5V 0 to +10V	±5V ±10V	0 to +70 –5 to +125	100kHz	50kHz	88dB	–96dB	24 Pin	(Note 1)
	MN6400	0 to +5V 0 to +10V	±5V ±10V	0 to +70 –55 to +125	50kHz	25kHz	88dB	–98dB	28 Pin	9177001
	MN6450	0 to +5V 0 to +10V	±5V ±10V	0 to +70 –55 to +125	47kHz	23.5kHz	88dB	–98dB	32 Pin	9225301
	MN6290 MN6291	0 to –10V N.A.	±5V ±10V	0 to +70 –55 to +125	20kHz	10kHz	84dB	–88dB	32 Pin	(Note 1)
14-Bits	MN5430	N.A.	±5V	0 to +70 –55 to +125	10MHz	5MHz	TBD	TBD	32 Pin	(Note 1)
	MN6259	N.A.	±5V	0 to +70 –55 to +125	1MHz	500KHz	82dB	–78dB	40 Pin	(Note 1)
12-Bits	MN6249	N.A.	±2.5V ±5V	0 to +70 –55 to +125	2MHz	1MHz	68dB	–72dB	40 Pin	(Note 1)

NOTES: 1. Contact the factory for information regarding DESC SMD's for these device types.

Analog-to-Digital Converters

Resolution	Model Number	Maximum Conversion Time (µsec) (1)	Internal Clock	Specified Temperature Range (°C)	Maximum Linearity Error (%FSR)	Guaranteed No Missing Codes Over Temperature	Power (mW)	DIP Package (Pins)	Hi-Rel Option	DESC SMD (5962-)
16-Bits	MN5295 MN5296	17	Yes	0 to +70 –55 to +125	±0.003 ±0.006	Yes (2) Yes (3)	945	32	Yes	8956901
	MN5290 MN5291	40	Yes	0 to +70 –55 to +125	±0.003 ±0.006	Yes (2) Yes (3)	810	32	Yes	8956301
	MN5284 Series	50	Yes	0 to +70	±0.003	Yes (4)	255	32	No	N.A.
12-Bits	ADC84	8	Yes	0 to +70 –25 to +85	±0.012	Yes	975	32	No	N.A.
	ADC85	8	Yes	0 to +70 –25 to +85	±0.012	Yes	975	32	No	N.A.
	ADC87	8	Yes	–25 to +85 –55 to +125	±0.012	Yes	1110	32	Yes	8850802
	MN5210 Series	13	No	0 to +70 –55 to +125	±0.012	Yes	845	24	Yes	89584 01-07
	ADC80	25	Yes	–25 to +85	±0.012	Yes	593	32	No	N.A.
	MN5200 Series	50	No	0 to +70 –55 to +125	±0.012	Yes	845	24	Yes	89583 01-07
	MN5250 Series	175	No	0 to +70 –55 to +125	±0.012	Yes	56	24	Yes	(Note 5)
8-Bits	MN5825	1	Yes	0 to +70 –55 to +85	±0.2	Yes	925	24	Yes	(Note 5)
	MN5101 MN5100	0.9 1.5	No	0 to +70 –55 to +125	±0.2	Yes	1125	24	Yes	(Note 5)
	MN5130 Series	2.5	No	0 to +70 –55 to +125	±0.2	Yes	680	18	Yes	(Note 5)
	MN5140 Series	2.5	No	0 to +70 –55 to +125	±0.2	Yes	680	18	Yes	(Note 5)
	MN5150	2.5	No	0 to +70 –55 to +125	±0.2	Yes	680	24	Yes	(Note 5)
	MN5120	6	No	0 to +70 –55 to +125	±0.2	Yes	680	18	Yes	(Note 5)

NOTES:
1. For models with an external clock, the table shows the minimum conversion time that will result in specified accuracy. For units with internal clock, maximum conversion time is listed.
2. No missing codes for 14 bits guaranteed over temperature.
3. No missing codes for 13 bits guaranteed over temperature.
4. No missing codes for 15 bits guaranteed over temperature.
5. Contact factory for information regarding DESC SMD's for these device types.

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324 Clark St., Worcester, MA 01606 (508) 852-5400

CMOS Flash Converters

Resolution	Model Number	Sampling Rate	SINAD (dB)	Specified Temp. Range (°C)	Maximum Linearity Error (LSB)	Guaranteed No Missing Codes Over Temperature	Power (mW)	DIP Package (Pins)	Hi-Rel Option	DESC SMD (5962-)
8-Bits	**MN5902**	20MHz	41	0 to +70 -55 to +125	±1	Yes	400	24	Yes	(Note 1)
	MN5908	15MHz	41	0 to +70 -55 to +125	±1	Yes	450	24	Yes	(Note 1)
6-Bits	**MN5909**	100MHz	34	0 to +70	±1	Yes	200	20	No	N.A.
	MN5906	50MHz	35	0 to +70 -55 to +125	±1	Yes	225	18	Yes	93262
	MN5911	35MHz	TBD	0 to +70	±1	Yes	675	44PLCC	No	N.A.

NOTES: 1. Contact factory for information regarding DESC SMD's for those device types.

Data Acquisition Systems

Resolution	Model	Input Channels	Acquisition Time to ±½LSB (μsec)	Conversion Time (μsec)	Throughput (Channels/sec)	Maximum Linearity Error (%FSR)	Power (mW)	DIP Package	Specified Temp Range (°C)	Hi-Rel Option	DESC SMD (5962-)
8-Bits	**MN7120**	8	5	6	90,000	±0.2	680	32 Pin	0 to +70 −55 to +125	Yes	(Note 1)
12-Bits	**MN7150-8** **MN7150-16**	8 16	9	9	55,000	±0.012	1785	62 Pin	0 to +70 −25 to +85 −55 to +125	Yes	8851404
	MN7145 **MN7146** **MN7147**	8	8	20	35,000	±0.012 ±0.024	710	28 Pin	0 to +70 −55 to +125	Yes	(Note 1)
	MN7140	8 (Expandable)	8	40	20,000	±0.012	1250	40 Pin	0 to +70 −25 to +85 −55 to +125	Yes	9079701
	MN7130	16 (Expandable)	6.5	N.A.	N.A.	±0.002 (Typ)	900	32 Pin	0 to +70 −55 to +125	Yes	9057101
16-Bits	**MN7450** **MN7451**	8	15 (Note 2)	16 (Note 2)	47,700 (Note 2)	±0.0015	658	40 Pin	0 to +70 −55 to +125	Yes	(Note 1)

NOTES: 1. Contact the factory for information regarding DESC SMD's for these device types.
2. Due to the design of the MN7450 Series DAS, the channel switching and PGA settling time can be pipelined with A/D conversion allowing for total throughput in the pipelined mode of 47.7kHz.

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Digital-to-Analog Converters

Resolution	Model Number	Maximum Settling Time (µsec) (1)	Internal Ref. and Output Op Amp	Specified Temperature Range (°C)	Maximum Linearity Error (%FSR)	Monotonic Over Temperature	Power (mW)	DIP Package	Hi-Rel Option	DESC SMD (5962-)
16-Bits	DAC71-V DAC71-I	10 1	Yes (2)	0 to +70	±0.003	(Note 3)	525	24 Pin	No	N.A.
	MN3290-V MN3290-I Series	8 1	Yes (2)	0 to +70 –55 to +125	±0.003	(Note 3)	525 435	24 Pin	Yes	8953103 8953104 8953102
12-Bits	DAC80-V DAC80-I	4 0.3 (Typ)	Yes (2)	0 to +70	±0.012	Yes	345	24 Pin	No	N.A.
	DAC85-V DAC85-I	4 0.3 (Typ)	Yes (2)	0 to +70 –25 to +85	±0.012	Yes	345	24 Pin	No	N.A.
	DAC87	4	Yes	–25 to +85 –55 to +125	±0.012	Yes	345	24 Pin	Yes	8300201
	DACHK	4	Yes	0 to +70 –55 to +125	±0.012	Yes	975	24 Pin	Yes	(Note 4)
	MN3850	4	Yes	0 to +70 –55 to +125	±0.012	Yes	345	24 Pin	Yes	(Note 4)
	DAC88	7	Yes	0 to +70 –55 to +125	±0.012	Yes	495	24 Pin	Yes	(Note 4)
	MN3860	7	Yes	0 to +70 –55 to +125	±0.012	Yes	495	24 Pin	Yes	9057001
	MN3348	8	Yes	0 to +70 –55 to +125	±0.012	Yes	195	24 Pin	Yes	(Note 4)
	MN3349	10	Yes	0 to +70 –55 to +125	±0.012	Yes	195	24 Pin	Yes	(Note 4)
	MN370 MN371	60 35	Yes	0 to +70 –55 to +125	±0.012	Yes	90	18 Pin	Yes	8981401 8981402
10-Bits	MN3040	10	Yes	0 to +70 –55 to +125	±0.05	Yes	450	18 Pin	Yes	(Note 4)
	MN3003 Series	30	Yes	0 to +70 –55 to +125	±0.05	Yes	450	16 Pin	Yes	(Note 4)
8-Bits	MN3008 MN3009	1	Yes	0 to +70 –55 to +125	±0.2	Yes	495	16 Pin	Yes	8768801 8768802
	MN3020	3	Yes	0 to +70 –55 to +125	±0.2	Yes	505	18 Pin	Yes	8971801
	MN3014	2.5	Yes	0 to +70 –55 to +125	±0.2	Yes	420	16 Pin	Yes	(Note 4)
	MN3000 Series	30	Yes	0 to +70 –55 to +125	±0.2	Yes	510	14 Pin	Yes	(Note 4)

NOTES:
1. Specified for a full scale output step settling to ±½LSB.
2. Current-output models do not have internal output op amps.
3. Monotonicity for 14 bits guaranteed over temperature.
4. Contact the factory for information regarding DESC SMD's for these device types.

Low Noise Pre-Amplifiers

Model Number	Voltage Noise	Current Noise	Fixed Gain	Specified Temp Range (°C)	Bandwidth	Power (mW)	Package	Hi-Rel Option	DESC SMD (5962-)
MN2310 Series	1.5nV/√Hz	4fA/√Hz	30dB 40dB 50dB	0 to +70 –55 to +125	1MHz	240mW	44CLCC	Yes	(Note 1)
MN2320 Series	0.8nV/√Hz	4fA/√Hz	40dB 50dB 60dB	0 to +70 –55 to +125	1MHz	240mW	44CLCC	Yes	(Note 1)

NOTES: 1. Contact the factory for information regarding DESC SMD's for these device types.

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Instrumentation Amplifier MN2200

Gain Ranges	Max Gain Error (%)	Offset Voltage (RTI, μV)	Offset Drift (μV/°C)	Small Signal BW (kHz)	Power (mW)	Specified Temp Range (°C)	DIP Pkg.	Mil-Std-883 Hi-Rel Option	DESC SMD (5962-)
1, 10, 100, 1000 Internal, 1 to 1000 with External Resistor	±0.01 to ±0.1 Depending on Range	±100 (G=100)	±0.6 (G=100)	750 (G=1)	240	−25 to +85 −55 to +125	18 Pin	Yes	(Note 2)

Programmable-Gain Amplifier MN2020

Gain Ranges	Max Gain Error (%)	Offset Voltage (RTI, μV)	Offset Drift (μV/°C)	Small Signal BW (kHz)	Power (mW)	Specified Temp Range (°C)	DIP Pkg.	Mil-Std-883 Hi-Rel Option	DES SMD (5962-)
1, 2, 4, 8, 16, 32, 64, 128 Digitally Programmed	±0.005 to ±0.2 Depending on Range	±100	±5	5000 (G=1)	275	0 to +70 −55 to +125	18 Pin	Yes	(Note 2)

Track-Hold Amplifiers

Application	Maximum Linearity Error (%)	Acquisition Time	Gain and Voltage Range	Model	Specified Temp Range (°C)	Aperture Jitter (psec)	Droop Rate (μV/μs)	Power (mW)	DIP Package	Hi-Rel Option	DESC SMD (5962-)
7-9 Bits	±0.1	35nsec 5V Step to ±0.1%	+1, ±2.5V	**MN379**	0 to +70 −55 to +125	1	±500	1575	24 Pin	Yes	(Note 2)
12-Bits	±0.01	40nsec 2V Step to ±0.1%	+1, ±1V	**MN4000**	0 to +70 −55 to +125	50	±200	750	24 Pin	Yes	9085601
	±0.01	160nsec 10V Step to ±0.01%	−1, ±10V	**MN376**	0 to +70 −55 to +125	40	±0.5	730	24 Pin	Yes	9073001
	±0.01	250nsec 10V Step to ±0.01%	−1, ±10V	**MN0300A**	0 to +70 −55 to +125	400	±5	730	24 Pin	Yes	(Note 2)
	±0.01	1μsec 10V Step to ±0.01%	−1, ±10V	**MN346**	0 to +70 −55 to +125	400	±0.1	640	14 Pin	Yes	8994002
	±0.01	1μsec 10V Step to ±0.05%	−1, ±10V	**MN347**	0 to +70 −55 to +125	400	±0.5	640	14 Pin	Yes	(Note 2)
	±0.01	6.5μsec 20V Step to ±0.01%	−1, ±10V	**MN7130**	0 to +70 −55 to +125	60 (Note 1)	±4	900	32 Pin	Yes	9057101
	±0.01	7.5μsec 10V Step to ±0.01%	−1, ±10V	**MN343**	0 to +70 −55 to +125	2000	±0.1	345	14 Pin	Yes	(Note 2)
	±0.01	7.5μsec 10V Step to ±0.05%	−1, ±10V	**MN344**	0 to +70 −55 to +125	2000	±0.4	345	14 Pin	Yes	(Note 2)
14-16 Bits	±0.003	3μsec 10V Step to ±0.003%	−1, ±10V	**MN374**	0 to +70 −55 to +125	400	±0.1	390	14 Pin	Yes	(Note 2)
	±0.003	8.5μsec 10V Step to ±0.003%	±1, ±10V	**MN373**	0 to +70 −55 to +125	1000	±0.5	300	14 Pin	Yes	(Note 2)

NOTES: 1. Listed specification is for typical Aperture Delay Time in nsec.
2. Contact the factory for information regarding DESC SMD's for these device types.

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V/F, F/V Converters

Full-Scale Range	Model #	Input Range	Dynamic Range	Type	Linearity	Power (mW)	DIP Package
2MHz	**MD3802**	0 to –10V	>2,000,000:1 >126 dB	V/F, F/V	±0.01%FS ±0.01% of Input	750	24 Pin
5MHz	**MD3805**	0 to –10V	>5,000,000:1 >134 dB	V/F, F/V	±0.02%FS ±0.02% of Input	850	24 Pin
10MHz	**MD3810**	0 to –10V	>10,000,000:1 >142 dB	V/F, F/V	±0.05%FS ±0.05% of Input	1000	24 Pin
2MHz	**MD3902**	0 to –10V	>2,000,000:1 >126 dB	V/F	±0.01%FS ±0.01% of Input	650	24 Pin
5MHz	**MD3905**	0 to –10V	>5,000,000:1 >134 dB	V/F	±0.02%FS ±0.02% of Input	800	24 Pin
10MHz	**MD3910**	0 to –10V	>10,000,000:1 >140 dB	V/F	±0.05%FS ±0.05% of Input	850	24 Pin

V/F - Based 20-Bit A/D Converters MD2840/2841/2842

Conversion Time (msec)	Model #	V/F Full-Scale	Differential Linearity (ppm)	Integral Linearity	Power (mW)	DIP Package
100	**MD2840**	10MHz	0.1	±0.05%FS ±0.05% of Input	1195	32 Pin
200	**MD2841**	5MHz	0.2	±0.02%FS ±0.02% of Input	1195	32 Pin
500	**MD2842**	2MHz	0.5	±0.01%FS ±0.01% of Input	1195	32 Pin

24-Bit, 50MHz Counter/Timer MD5024

Counter Range	Programmable Time Base	Operating Mode	μP Interface	Application Mode	Power (mW)	DIP Package
24 Bits	1 to 16 X 10^7 Clock Periods	Continuous or Triggered	8 or 16 Bits	Frequency Counting or Period Measurement	700	40 Pin

Precision Oscillators

Model Number	Function	Frequency	Jitter (psec)	Temperature Range (°C)	Output Format	DIP Package
MD100 Series	Master Clock Oscillator	50MHz to 650MHz	25	0 to +70 –25 to +85	ECL PECL ECLinps	24 Pin
MD200/210 Series	Frequency Multiplier	50MHz to 650MHz	25	0 to +70 –25 to +85	ECL PECL ECLinps	24 Pin
MD300 Series	Voltage Controlled Oscillator	50MHz to 650MHz	25	0 to +70 –25 to +85	PECL	14 Pin

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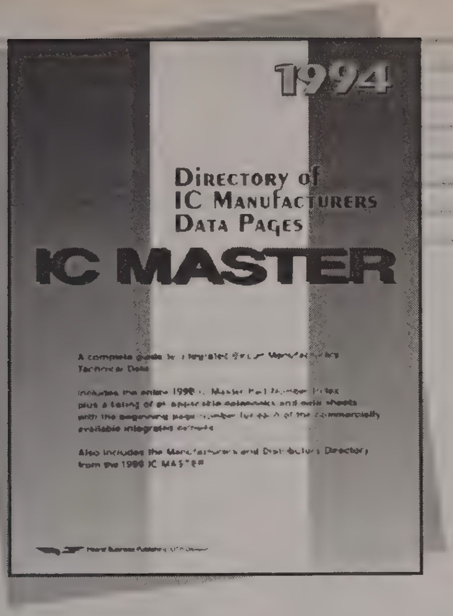

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Product Selection Guide

Mosel-Vitelic Inc. designs, manufactures, and markets high performance and application specific DRAMs, SRAMs, and Video RAMs worldwide. The company is headquartered in the Science Based Industrial Park, Taiwan and has subsidiaries in the US, Hong Kong, and Japan. Mosel-Vitelic's US headquarters is located at 3910 N. First Street, San Jose, CA 95134. Telephone number is 408-433-6000.

DRAMs

Part Number	Description	Speed(s) (ns)	Package(s)	Icc Max. (mA)	Iccsb Max. (mA)	Availability
V53C256A	256K x 1 DRAM	70, 80, 100	J, P	60	1.2	Now
V53C464A	64K x 4 DRAM	70, 80, 100	J, P	65	0.2	Now
V53C864	64K x 8 DRAM	70, 80, 100	K, P	65	1	Now
V53C100F	1 Meg x 1 DRAM	60, 70, 80	K, P	90/80/70	2	Now
V53C100H	1 Meg x 1 DRAM	45, 50, 55, 60	K, P	110/100/90/85	0.15	Now
V53C100N	1 Meg x 1 DRAM 3.3-V	60, 70, 80	K, P	45/40/35	0.04	Now
V53C104F	256K x 4 DRAM	60, 70, 80	K, P	90/80/70	2	Now
V53C104H	256K x 4 DRAM	45, 50, 55, 60	K, P	110/100/90/85	0.15	Now
V53C104N	256K x 4 DRAM 3.3-V	60, 70, 80	K, P	45/40/35	0.04	Now
V53C664	64K x 16 DRAM	80, 100	K	115/90	1	Now
V53C8256H	256K x 8 DRAM	45, 50, 55, 60	K, P	160/150/145/135	1	Now
V53C8256N	256K x 8 DRAM 3.3-V	60, 70, 80	K, P	65/60/55	1	Q1'94
V53C8512	512K x 8 DRAM	50, 60, 70	K	120/110/105	1	Q1'94
V53C9512	512K x 9 DRAM	50, 60, 70	K	105/90/75	1	Q1'94
V53C400F	4 Meg x 1 DRAM	60, 70, 80, 100	K	100/90/80/70	1	Now
V53C404F	1 Meg x 4 DRAM	60, 70, 80, 100	K	100/90/80/70	1	Now

DRAM Modules

Part Number	Description	Speed(s) (ns)	Package(s)	Icc Max. (mA)	Iccsb Max. (mA)	Availability
V104J8	256K x 8 SIMM (2 chips)	60, 70, 80	S	130	2	Now
V100J8	1 Meg x 8 SIMM (8 chips)	60, 70, 80	S	480	8	Now
V404J8	1 Meg x 8 SIMM (2 chips)	70, 80	S	140	2	Now
V400J8	4 Meg x 8 SIMM (8 chips)	70, 80	S	560	8	Now
V104J9	256K x 9 SIMM (3 chips)	70, 80	S	160	4	Now
V100J9	1 Meg x 9 SIMM (9 chips)	60, 70, 80	S	540	9	Now
V404J9	1 Meg x 9 SIMM (3 chips)	70, 80	S	240	3	Now
V400J9	4 Meg x 9 SIMM (9 chips)	70, 80	S	660	13	Now
V104J36	256K x 36 SIMM (12 chips)	70, 80	S	760	12.8	Now
V104J236	512K x 36 SIMM (24 chips)	70, 80	S	1320	24	Now
V400J36	4 Meg x 36 SIMM	70, 80	S	3780	36	Now
V404J36	1 Meg x 36 SIMM (12 chips)	70, 80	S	900	12	Now
V404J236	2 Meg x 36 SIMM	70, 80	S	3240	40	Now

Notes: 1. Iccsb = CMOS standby current
2. Contact factory for x32 DRAM module information

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Product Selection Guide

Video RAMs

Part Number	Description	Speed(s) (ns)	Package(s)	Icc Max. (mA)	Iccsb Max. (mA)	Availability
V53C261	64K x 4 Video RAM	100, 120	K, P, Z	60/50	6	Now
V52C4256/8	256K x 4 Video RAM	60, 70, 80, 100	K, Z	95/85/75/65	7	Now
V52C8126/8	128K x 8 Video RAM	70, 80, 100	K, Z	90/80/70	7	Now
V52C8254	256K x 8 Video RAM	60, 70, 80	K	95/85/75	8	Q1'94
V52C8255	256K x 8 Video RAM	60, 70, 80	K	95/85/75	8	Q1'94
V52C8256	256K x 8 Hyper Page Mode VRAM	60, 70, 80	K	95/85/75	8	Q1'94
V52C8258	256K x 8 Video RAM	60, 70, 80	K	95/85/75	8	Q1'94

High Speed SRAMs

Part Number	Description	Speed(s) (ns)	Package(s)	Icc Max. (mA)	Iccsb Max. (mA)	Availability
MS6264A	8K x 8 SRAM	20, 25, 35	N, R	150	0.1 / 3	Now
MS62256A	32K x 8 SRAM	20, 25, 35, 45	N, R	180	10	Now
MS62256H	32K x 8 High Speed SRAM	15, 20, 25, 35	N, R	200	40	Now
MS621002	256K x 4 SRAM	20, 25, 35	K	130	1	Now
MS621008	128K x 8 SRAM	20, 25, 35	K	150	2	Now

Standard SRAMs

Part Number	Description	Speed(s) (ns)	Package(s)	Icc Max. (mA)	Iccsb Max. (mA)	Availability
MS6516	2K x 8 SRAM	100	P, S	70	0.01	Now
MS6264	8K x 8 SRAM	70, 100	F, P	85	0.1	Now
MS6264N	8K x 8 SRAM 3.3V	100	F, P	50	0.1	Now
MS6265	8K x 8 Low Power SRAM	100	F, N, P	40	0.01	Now
MS62256	32K x 8 SRAM	100	N, F, P	70	0.1	Now
		70	N, F, P	80	0.1	Now
MS62256C	32K x 8 SRAM - Low Low Power	70, 100	F, N, P	80	0.02	Now
MS62256N	32K x 8 SRAM 3.3V	70, 100	S, R	60	0.1	Now
MS628128	128K x 8 SRAM	80, 100, 120	F, P	80	3	Q2'94

FIFOs

Part Number	Description	Speed(s) (ns)	Package(s)	Icc Max. (mA)	Iccsb Max. (mA)	Availability
MS7200	256 x 9 FIFO	25, 35	F, J, N, P	125	0.5	Now
MS7201A	512 x 9 FIFO					
MS7202A	1K x 9 FIFO	50, 80	F, J, N, P	80	0.5	
MS7203	2K x 9 FIFO	50, 80	F, J, N, P	125	2	Now
		20, 25, 35	J, N, P	125	2	Now
MS7204	4K x 9 FIFO	50, 80	F, J, N, P	125	2	Now
		20, 25, 35	J, P	125	2	Now
MS76215	512 x 18 Synchronous FIFO	20, 25, 30	G, J	200	--	Now
MS76225	1K x 18 Synchronous FIFO					
MS76500A	64 x 16 Bi-Directional FIFO	25, 30	J	75		Now
MS76502A	256 x 16 Bi-Directional FIFO	25, 30	J	75		Now
MS76542	256 x 36 x 2 Bi-Directional FIFO	25, 30, 35	G, Q	180	1	Now

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Static NMOS-RAMs

Part Number	Organization	Access Time (ns)
AM9122	256x4	25,35
AM91L22	256x4	25,45
AM9044	4096x1	45,30,25,20
AM90L44	4096x1	45,30,25,20
AM9114	1024x4	45,30,20
AM91L14	1024x4	45,30,20
AM2147	4096x1	35,45,55,70

Static NMOS-RAMs

Part Number	Organization	Access Time (ns)
AM21L47	4096x1	45,55,70
AM2148	1024x4	35,45,55,70
AM21L48	1024x1	45,55,70
AM2149	1024x1	35,45,55,70
AM21L49	1024x1	45,55,70
AM9150	1024x4	20,25,35,45
AM91L50	1024x4	25,35,45

Static NMOS-RAMs

Part Number	Organization	Access Time (ns)
AM2167	16,384x1	35,45,55,7
AM2168	4096x4	35,45,55,70
AM2169	4096x4	40,50,70
AM9128	2048x8	70,90,10,12 15,20
AM2130	1024x8	55,70,10,12

Shift Registers

Part Number	Capacity/ Organization	Mode
AM2802/1402	Quad 256	Dynamic
AM2803/1403	Dual 512	Dynamic
AM2804/1404	Single 1024	Dynamic
AM2833	Single 1024	Static
AM2847/3347	Quad 80	Static
AM2855	Quad 128	Static
AM2856	Dual 256	Static
AM2857	Single 512	Static

First-In First-Out Memories

Part Number	Organization	Temp. Range
AM2812	32 x 8	C,E*
AM2812A	32 x 8	C,E
AM2813	32 x 8	C,E
AM2813A	32 x 8	C,E
AM2841	64 x 4	C,E
AM2841A	64 x 4	C
AM3341	64 x 4	C,E
AM3341A	64 x 4	C

*E is extended temperature range, -55°C to 85°C.

U.V. Erasable Proms

Part Number	Organization	Temp. Range
AM1702A	256 x 8	C,E
AM1702AL	256 x 8	C,E
AM1702A-1	256 x 8	C,E
AM1702AL-1	256 x 8	C,E
AM1702A-2	256 x 8	C,E
AM1702AL-2	256 x 8	C,E

NOTE: **CMOS Flash Memory** AM28F020 (256K X 8) - Low Endurance, Also Available.

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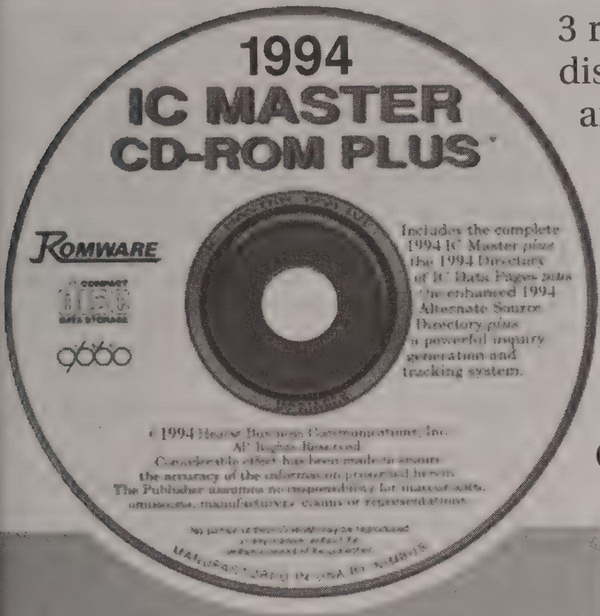
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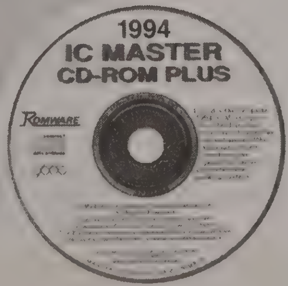
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NCR SCSI PRODUCTS

53C810/53C820/53C825 PCI/SCSI FAMILY

Highlights

- *Supports Peripheral Component Interconnect (PCI) bus standard*
- *Fast SCSI transfer rates of 10 MB/s asnyn., 20 MB/s sync.*
- *Burst transfers on PCI bus exceeds 110 MB/s*
- *Full SCSI-2 support; command queuing*
- *TolerANT® technology*
- *Fully supported by NCR SDMS software*

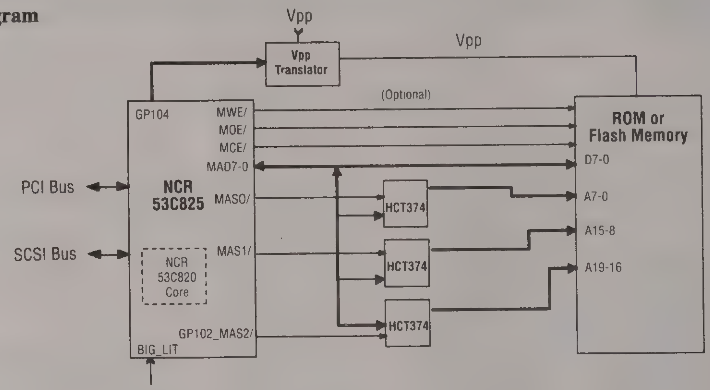
Packaging:

53C810; 100-pin PQFP
53C820; 144-pin PQFP
53C825; 160-pin PQFP

The NCR 53C810 and 53C820 include all the high-performance features of the NCR 53C720, and are designed to connect gluelessly to the standard Peripheral Component Interconnect (PCI) bus. These devices are ideal for placement directly on a motherboard, allowing PCI-based workstations or personal computers to achieve the maximum I/O performance provided by SCSI. Both devices support fast SCSI transfer rates and burst transfers on the PCI bus in excess of 110 MB/s.

The 53C810, 53C820 and 53C825 provide full SCSI-2 capabilities, including command queuing. They feature NCR TolerANT® SCSI driver and receiver technology, and are SCRIPTS-compatible with the NCR 53C720. The 53C820 includes all of the features of the 53C810, with additional support for wide SCSI (16-bit) data transfers and differential operation. The 53C825 adds support for local PROM; burst op-code fetches built-in flash memory programming logic; big and little endian modes.

NCR 53C825 System Diagram



53C720 FAST AND WIDE SCSI I/O PROCESSOR

Highlights

- *Supports SCSI A or wide P cable and 16 SCSI devices*
- *Host bus DMA burst transfer rate of 101 Mbytes/sec.*
- *16- or 32-bit bus master*
- *Memory-to-memory transfers in excess of 53 Mbytes/sec.*
- *TolerANT® technology with NCR's proprietary Active Negation Technology*
- *Highest performance SCSI core*
- *Fully supported by NCR SDMS software*

Package: 208-pin PQFP

The 53C720 provides host-to-peripheral interfacing by allowing a full range of SCSI transfer rates (10 Mbytes/sec. asynchronous and 20 Mbytes/sec. synchronous) and supporting eight different host bus configurations. Providing the functions of an intelligent adapter board on a single chip, the 53C720 greatly reduces SCSI I/O overhead time and improves CPU bus utilization. In addition, the 53C720 features an advanced SCRIPTS™ processor, permitting it to support wide SCSI with odd byte transfers and 16 devices on the SCSI bus. Its TolerANT® drivers improve data integrity in any cabling environment. The 53C720 is downward SCRIPTS-compatible with the 53C710.

53C406A/53CF406A EISA/ISA-TO-SCSI HOST ADAPTERS

Highlights

- *Software-compatible with the industry standard 53C94/95/96*
- *24 mA drivers provide direct connection to the PC/AT bus*
- *48 mA TolerANT® drivers allow direct connection to SCSI bus*
- *Low power mode minimizes power consumption for mobile computing applications*
- *8/16-bit programmed I/O or DMA data transfers*
- *53CF406A transfers data at 10 Mbytes/sec. on SCSI bus*
- *Fully supported by NCR SDMS software*

Package: 100-pin PQFP

NCR's 53C406A 16-bit single-chip, EISA/ISA-to-SCSI host adapter delivers all of the performance and connectivity of SCSI to the PC. At the core of the device is the NCR 53C94/95/96, as well as support logic for an external ROM BIOS and an off-chip floppy controller. The chip also has 256 bytes of on-board RAM for scratch pad use by the SDMS CAMcore BIOS and 128 bytes of FIFO for speed matching on the host bus. And for reliable performance regardless of cabling, the 53C406A's SCSI drivers feature NCR's TolerANT® Active Negation Technology. Software-compatible with the industry-standard 53C94/95/96, the 53C406A allows data transfers of up to 5 Mbytes/sec. while the 53CF406A transfers data up to 10 Mbytes/sec.

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Microelectronic
Products Division
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NCR SCSI, SCSI DISK ARRAY CONTROLLER AND GUI PRODUCTS

53C400A ADVANCED SINGLE-CHIP SCSI HOST ADAPTER

Highlights

- *Cost-effective solution*
- *I/O mapping, maintaining compatibility with existing PCs*
- *Low power feature minimizes power consumption for mobile computing applications*
- *Zero wait-state improves performance, eliminates timing problems*
- *Fully supported by NCR SDMS software*
- *Operates in initiator or target role*

Package: 68-pin PLCC

The 53C400A delivers high performance and low cost in a single or multiple chip host adapter solution. It's designed to work with IBM® PC/XT™/AT™ and PS/2 Model 25, 30 or 30-286 system buses plus a variety of laptop or single-board computers and host adapters. The 53C400A is also software-compatible with NCR 53C400 and 53C80 SCSI chips and gives users improved asynchronous SCSI bus performance plus on-chip dual 128-byte alternating buffers which provide data buffering for speed matching.

53CF94/53CF96 FAST SCSI CONTROLLERS

Highlights

- *Fully-compatible with 53C94/53C96 advanced SCSI controllers*
- *Sustained data transfer rates up to 10 Mbytes/sec. synchronous; 7 Mbytes/sec. asynchronous*
- *53CF94 has on-chip 48 mA drivers for single-ended transmission*
- *53CF96 offers single-ended and differential mode operation*

Package: 84-pin PLCC or 100-pin PQFP

The 53CF94/96 controllers are high-performance CMOS devices that maximize SCSI transfer rates. The fast devices are fully pin-compatible with the 53C94/96 advanced SCSI controllers, providing all of the advanced series functions as well as additional features such as fast SCSI, TolerANT® Active Negration Technology, a 24-bit transfer counter and a unique ID code which includes the chip revision level. These fast devices meet SCSI-1 and SCSI-2 standards and effectively reduce protocol overhead by performing common SCSI algorithms in response to a single command. The controllers operate in four different host bus configurations (two single-bus and two dual-bus modes.)

77C32BLT VL-BUS GRAPHICAL USER INTERFACE (GUI) ACCELERATOR WITH BLOCK LOGIC TRANSFER

Highlights

- *TruColor GUI Accelerator*
- *110 MHz dot clock*
- *Fully autonomous BLT engine with embedded clipping, fill and line draw support*
- *Full 32-bit, glue-free VL interface (including BIOS and RAMDAC) for zero wait state operation*
- *BLT rates over 60 MB/s*
- *Monitor power management support*

Package: 208-pin PQFP

The 77C32BLT is a TruColor GUI accelerator for VL bus. The 110 MHz dot clock supports display of 1280 x 1024, 256 colors non-interlaced. Frame buffer data rates in excess of 120 MB/s, 150 MB/s peak (using 60 ns DRAMSs) are supported, without interleaving or extra buffers, through the full 32-bit architecture and advanced DRAM frame buffer controller. The 77C32BLT features a fully automatic BLT engine with 256 op BLTs, color expand, monochrome and color transparency, pattern fetch, imbedded masking and special text BLT modes. The full 32-bit VL interface eliminates external decode delays, plus provides a direct interface to all BIOS and RAMDAC signals with no glue and no ISA bus connections. Linear frame buffer addressing and a memory mapped accelerator control menu provide optimum performance with a simple, easy to use, software interface. The 77C32BLT also supports DPMS (Display Power Management System) through sync signal level controls.

NCR ADP 93-01/04 SCSI DISK ARRAY CONTROLLER

The NCR ADP-93-01 and ADP-93-04 are intelligent disk array controllers capable of managing an array of up to 35 SCSI disk drives. The controllers can manage an array in either a RAID-0 (data-striped), RAID-1 (mirrored), RAID-3 (parallel transfer), or RAID-5 (independent transfer) level of operation. The NCR ADP-93-01 provides a high-bandwidth, SCSI-2 single-ended channel connection to the host system. The NCR ADP-93-04 provides a high-bandwidth, SCSI-2 differential channel connection to the host system.

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SEIKO NPC
Group

Company Profile

Nippon Precision Circuits Ltd. (NPC), established in 1975, designs and manufactures high-performance integrated circuits for Audios, Oscillators, Data-acquisitions and Communications applications. The NPC headquarters is located in Tokyo, Japan and has sales representatives and distributors all over the world to support customers' needs.

Product Selection Guide

Digital Filters

Part Number	Configuration	X fs	Passband ripple (db)	Stopband attenuation (db)	Input/ Output	Typical Application	Package
SM5803A	2 channels	4, 8	+/–0.00005	110	Serial	Wide functionality	28 pin DIP
SM5813A	2 channels	8	+/–0.00005	110	Serial	High efficiency	28 pin DIP
SM5841A	2 channels	4, 8	0.2+/–0.03	53	Serial	CD, DAT, PCM replay	18 pin DIP 22 pin SOP
SM5841B	2 channels	4, 8	0.2+/–0.03	53	Serial	CD, PCM replay DC offset	18 pin DIP 22 pin SOP
SM5841C	2 channels	8	0.2+/–0.03	53	Serial	CD, PCM replay Mode select	18 pin DIP 22 pin SOP
SM5841D	2 channels	4, 8	0.2+/–0.03	53	Serial	Hi speed Dubbing application	18 pin DIP 22 pin SOP
SM5815	2 channels	1/4, 1/2	+/–0.0005 +/–0.0002	88 95	Serial	1/4 decimation in frequency filter	18 pin DIP
SM5842A	2 channels	8	+/–0.00002	117	Serial	24 bit input Professional use	28 pin DIP
SM5843A	2 channels	8	+/–0.00005	110	Serial	20 bit input Dual filter	28 pin DIP 28 pin SOP
SM5881	2 channels	4, 8	0.125+/–0.03	55	Serial	High performance Low power	22 pin SOP
SM5831	4 on chip mulitplier	15/25 MHz	Programmable	Programmable	Parallel	High speed video	64 pin QFP 68 pin PGA

Audio Digital Signal Processor

Part Number	Description	Features	Package
SM5852A	Audio DSP	Digital Dynamic Bass Boost and Digital Dynamic-Range Compression Sound	16 pin SOP
SM5853A	Audio DSP	Digital Dynamic Bass Boost and Digital Dynamic-Range Compression Sound with 8fs Digital filter and 1 bit D/A converter	44 pin QFP

D/A converters with DF

DAC with DF

Part Number	X fs of DF	Noise shaper frequency (X fs)	Noise shaper	THD+N (%)	S/N ratio (dB)	Future	Package
SM5871A	8	32	3rd order ZSNS	0.0022	108	Double speed operation	28 pin SOP
SM5872A	8	32	4th order ZSNS	0.0020	102	Hi performance	28 pin SDIP 28 pin SOP
SM5874A	8	32	3rd order	0.0025	96	Hi performance	28 pin SSOP

For Immediate Product Assistance, Call Toll-Free 1-800-237-4590 (Outside CA.)
TEL: 408-922-0133 FAX: 408-922-0137

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SEIKO Group NPC

Product Selection Guide

A/D Converters

Part Number	Description	Features	Package
SM6103	8 bit A/D converter	0.65 us conversion time, +/–1/2 LSB linearity, 200 mV/us input throughput, no external sample and hold circuit, CPU interface.	20 pin DIP 20 pin SOP
SM6104	6 bit flash A/D converter	20 MHz conversion rate, +/–1/2 LSB linearity (typ.), three-state control ouput, no external sample and hold circuit.	18 pin DIP 18 pin SOP
SM6106	8 channel, 8 bit A/D	0.7 us conversion time, +/–1/2 LSB linearity, 200 mV/us input throughput, no external sample and hold circuit, CPU interface	28 pin DIP 28 pin SOP
SM6011	8 bit A/D, two 8 bit D/As	1.0 us A/D conversion time, no external sample and hold circuit, 2.5us D/A settling time, voltage output.	28 pin DIP 28 pin SOP

Peripheral ICs

Part Number	Description	Features	Package
SM5823A	24 bit serial-to-parallel / parallel-to-serial converter	Two-way conversion for 8-, 16-, and 24-bits, 30 MHz operating frequency	42-pin SDIP
SM5829P	High-speed, 8-bit variable length shift register	8-bit parallel I/O, 2 to 129 stages user-selectable, shift and rotate modes, 33 MHz max. operation	30-pin SDIP
SM5824P	High-speed, advanced 10-bit shift register	10-bit parallel I/O, 2 to 65 stages user-selectable, operating frequency 33.3 MHz msx.	30-pin SDIP

PLL

Part Number	Description	Features	Package
PLL2001	General purpose high frequency PLL	250 MHz (typ) direct input, serial data input for programmable divider	16 pin DIP 16 pin SOP
PLL0305	High speed serial input synthesizer	30 MHz input frequency	18 pin DIP

Nippon Circuits Ltd.

Oscillator modules

Part Number	Osc. (MHz) Frequency		Division	Supply current (mA)	Internal capacitance		Rf (Ω)	Package
	3V	5V			C_G (pF)	C_D (pF)		
SM5603		50	1, 1/2	12.8	—	—	2.5M	Die
SM5605		30	1, 1/2, …1/16	3.2	20	20	2.5M	Die
SM5606		30	1, 1/2, …1/256	16	20	20	2.5M	Die
SM5610		30	1, 1/2, 1/4, 1/8	4, 16	27	27	2.5M	Die/SOP
SM5613		22-50	1	4, 16	15	15	2.5M	Die/SOP
SM5617		22-70	1	4, 16	10/12	10/17	2.7-4.5k	Die/SOP
SM5619		30	1, 1/2, …1/8	4, 16	21	21	100k	Die
SM5623	33-70	45-100	1	16	10/17	10/17	2.2-4.7k	Die
SM5624	30	30	1, 1/2, …1/8	4, 16	20	20	2.5M	Die

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BIPOLAR LINEAR INTEGRATED CIRCUITS

Operational Amplifiers

Part Number	Main Feature	Circuits /Unit	Operating Voltage	Supply Current	Output Current	Unity Gain Frequency	Package
Single Supply							
NJM2904 *	General Purpose	2	3 to 32V	0.7mA	20mA	0.8MHz	D, L, M, E8, S9
NJM3404A *	Low Distortion	2	to 36V	2.0mA	20mA	1.2MHz	D, L, M, E8, S9
NJM3415 *	High Output Current	2	to 15V	5.5mA	110mA	1.3MHz	D, L, M, E8, S9
NJM3403A *	Low Distortion	4	to 36V	3.0mA	20mA	1.2MHz	D, M14
Dual Supply							
NJM318 *	High Speed	1	to ±20V	5.0mA	20mA	15MHz	D, T, M, E8
NJM4250 *	Low Supply Current	1	±1 to ±18V	Variable	Variable	Variable	D, M, E8
NJM5534 *	Low Noise	1	to ±22V	4.0mA	50mA	10MHz	D, M8
NJM4558 *	General Purpose	2	to ±18V	3.5mA	12mA	2MHz	D, L, T, M, E8, S9
NJM022B *	Low Supply Current	2	±2 to ±18V	250μA	10mA	—	D, L, M, E8
NJM4560 *	Low Noise	2	to ±18V	3.5mA	25mA	10MHz	D, L, T, M, E8, S9
NJM2041 *	Low Noise	2	to ±22V	6.0mA	25mA	7MHz	D, L, M, E8, S9
NJM062 *	J-FET Input	2	to ±18V	400μA	12mA	1MHz	D, L, M, E8, S9
NJM072B *	J-FET Input	2	to ±18V	3.0mA	25mA	3MHz	D, L, M, E8, S9
NJM353 *	J-FET Input	2	to ±18V	3.6mA	16mA	4MHz	D, T, M8
NJM2082 *	J-FET Input	2	to ±18V	4.0mA	40mA	5MHz	D, L, M8, S9
NJM2068 *	Low Noise	2	to ±18V	5.0mA	50mA	5.5MHz	D, L, M, E8, S9
NJM5532 *	Low Noise	2	to ±22V	9.0mA	50mA	10MHz	D, M8, S9
NJM4556 *	High Output Current	2	to ±18V	9.0mA	70mA	8MHz	D, L, M, E8, S9
NJM2058 *	General Purpose	4	to ±18V	3.5mA	12mA	2MHz	D, M14
NJM2060 *	Low Noise	4	to ±18V	3.5mA	25mA	10MHz	D, M14
NJM064 *	J-FET Input	4	to ±18V	800μA	12mA	1MHz	D, M14
NJM074 *	J-FET Input	4	to ±18V	6.0mA	25mA	3MHz	D, M14

Audio and Video ICs

Part No.	Description	Application Examples	Package
NJM386 *	Low Voltage Power Amplifier	AM/FM Radios, Portable Tape Player	D, L, M, E, S9
NJM2067 *	Dual Pre-amplifier	Head Phone Stereos	D, M14
NJM2073 *	Dual Power Amplifier	AM/FM Radios, Portable Tape Player	D, M8, S9
NJM592 *	Differential Video Amplifier	VCR, Audio Equipment	D, M14
NJM2219 *	RF Modulator	VCR	D16
NJM2228 *	Frequency Doubler/Tripler	VCR	D, M8, S9
NJM2234 *	3-input 1-output Video Switch	VCR, Audio Equipment	D, M8, S9
NJM2244 *	Video Switch with 75Ω Driver	VCR, Audio Equipment	D, M8, S9

OPTO DEVICES

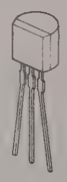
Photo Couplers

Part Number	Couplers /Unit	Isolation Voltage	Emitter		Detector		Package
			Forward Current	Reverse Voltage	C-E Voltage	Collector Current	
NJL5151 **	1	4000V	to 70mA	6V	35V	50mA	D, M4
NJL5152 **	2	4000V	to 50mA	6V	35V	50mA	D, M8
NJL5153 **	3	4000V	to 50mA	6V	35V	50mA	D, M12

Package Outlines

Package Table

TYPE	SYMBOL
TO-92	-
TO-220	-
SOT-89	U
TO-220F	F
DIP	D
DMP	M
EMP	E
SIP/ZIP	S
SOP	G
FSIP	S
HDIP	K
SDIP/SIP	L
QFP	F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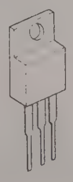
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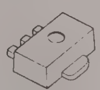
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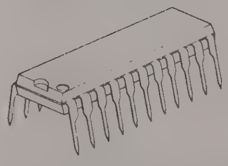
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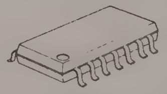
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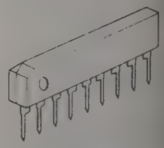
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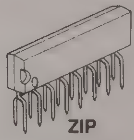
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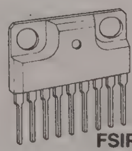
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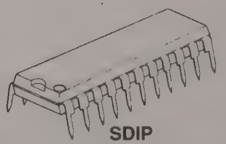
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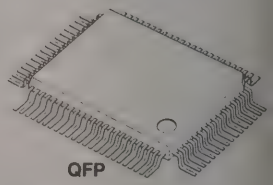
QFP

* SMT packages are available (M-packages are Japanese standard size packages, and E-packages are U.S. standard). * * Packages are (not standard).

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C-MOS LINEAR / DIGITAL INTEGRATED CIRCUITS

Voltage Regulators

Part Number	Output Voltage	Maximum Input Voltage	Output Current	Line Regulation	Package (see previous page)
NJU7201 *	+1.2, 1.5, 2.5, 2.7, 3.0, 3.2 +3.5, 4.0, 4.5, 5.0, 5.2, 5.5	+14V	100 mA	0.1%V	L, U
NJU7211 *	-3.0, -5.0V	-18V	100 mA	0.1%V	L, U

Voltage Converters

Part Number	Operating Voltage	Voltage Conv. Rate	Int. Osc.	External Components	Package (see previous page)
NJU7660 *	+1.5V ÷ +10.0V	99.9% (Neg.)	5 KHZ	2 Caps (Neg.) 2 Caps, 2 Res, 1Diode (pos.)	D, M
NJU7662 *	+4.5 ÷ +20.0V	99.9% (Neg.)	10 KHZ	2 Caps (Neg.) 2 Caps, 2 Res, 1 Diode (pos.)	D, M

Operational Amplifiers

Part Number	Main Feature	Circuits /Unit	Operating Voltage	Supply Current	Input Current	Band Width	Package (see previous page)
NJU7001 *	Low Supply Current	1	1 to 18V	15µA	1pA	0.1MHz	D, M8
NJU7002 *	Low Supply Current	2	1 to 18V	30µA	1pA	0.1MHz	D, M8
NJU7004 *	Low Supply Current	4	1 to 18V	60µA	1pA	0.1MHz	D, M14

Quartz Crystal Oscillators

Part Number	Operating Voltage	Operating Current	Stand-by Current	Fanout Ability	Frequency	Package (see previous page)
NJU6323 *	3 to 6V	10mA	100µA	10LSTTL	to 50MHz	E8, Chip
NJU6331 *	4 to 6V	15mA	100µA	5TTL	20 to 75MHz	E8, Chip
NJU6332 *	4 to 6V	15mA	100µA	10LSTTL	20 to 75MHz	E8, Chip
NJU6341 *	4 to 6V	25mA	100µA	5TTL	to 120MHz	E8, Chip

LCD Controller/Drivers

Part Number	Description	Package (see previous page)
NJU6408 *	Dot Matrix LCD Display Controller Driver (8C x 2L)	F80
NJU6420 *	1-chip Dot Matrix LCD Display Controller Driver (16C x 2L)	F100
NJU6423 *	1-chip Dot Matrix LCD Display Controller Driver (20C x 2L)	F100
NJU6406	1-chip Dot Matrix LCD Display Controller Driver (24C x 2L)	Chip 118
NJU6426 *	Dot Matrix LCD Display Controller Driver (8C x 4L) with Expansion	F100
NJU6407 *	Dot Matrix LCD Display Expansion Driver (40 seg.)	F56
NJU6417 *	Dot Matrix LCD Display Expansion Driver (64 seg.)	F80
NJU6432 *	104-Segment 1/2 duty LCD Driver	F64
NJU6435 *	1/2 duty (80 seg.) 1/2 duty (120 seg.) LCD Driver with Key Scan	F64
NJU6418 *	Dot Matrix LCD Display Common Driver (68 com.)	F80
NJU6419 *	Dot Matrix LCD Display Segment Driver (80 seg.)	F100

Microprocessor Peripheral

Part Number	Description	Package (see previous page)
NJU6355 *	Serial Interface Real Time Clock for 4-bit CPU	D, M8
NJU3711 *	8-bit Serial In Parallel Out	D, M14
NJU3712 *	8-bit Serial In Parallel Out with Cascade Function	D, M16
NJU3713 *	12-bit Serial In Parallel Out	D, G18
NJU3715 *	16-bit Serial In Parallel Out	L, G22
NJU3718 *	20-bit Serial In Parallel Out with Cascade Function	L, G28
NJU3719	24-bit Serial In Parallel Out	L15

*SMT packages are available (M-packages are Japanese standard size packages, and E-packages are U.S. standard).

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DRAM MEMORY MODULES

64 K DRAM BASED MODULES SPEEDS — 120, 150, 200 nS.

PART NUMBER	ORGANIZATION	DIMENSIONS	PKG.
PEP4064EC4	64KX4	2.2X0.42X0.180	22 PIN SIP
PEP4064EC5	64KX5	2.9X0.42X0.180	24 PIN SIP
PEP4064EL8*	64KX8	3.0X0.60X0.180	30 PIN SIP
PEP4064EL9*	64KX9	3.0X0.60X0.180	30 PIN SIP

256 K DRAM BASED MODULES — 60, 70, 80, 100, 120, 150 nS.

PART NUMBER	ORGANIZATION	DIMENSIONS	PKG.
PEP4256EC4	256KX4	2.2X0.42X0.180	22 PIN SIP
PEP4256EC5	256KX5	2.9X0.42X0.180	24 PIN SIP
† PEP4256EL8*	256KX8	3.0X0.60X0.180	30 PIN SIP
† PEP4256EL9*	256KX9	3.0X0.60X0.180	30 PIN SIP
PEP4256EL8-LP	256KX8	3.0X0.45X0.320	30 PIN SIP
PEP4256EL9-LP	256KX9	3.0X0.45X0.320	30 PIN SIP

1M BIT DRAM BASED MODULES — 60, 70, 80, 100 nS.

PART NUMBER	ORGANIZATION	DIMENSIONS	PKG.
PEP1MX4	1MX4	2.8X0.42X0.180	24 PIN SIP
PEP1MX5	1MX5	3.5X0.42X0.180	26 PIN SIP
† PEP1MX8*	1MX8	3.2X0.775X0.190	30 PIN SIP
† PEP1MX9*	1MX9	3.2X0.775X0.190	30 PIN SIP
PEP1MX8-LP	1MX8	3.5X0.435X0.320	30 PIN SIP
PEP1MX9-LP	1MX9	3.5X0.435X0.320	30 PIN SIP

4M BIT DRAM BASED MODULES — 60, 70, 80 nS.

PART NUMBER	ORGANIZATION	DIMENSIONS	PKG.
PEP4MX8*	4MX8	3.5X0.975X0.180	30 PIN SIP
PEP4MX9*	4MX9	3.5X0.975X0.180	30 PIN SIP
PEP4MX9	4MX9	3.50X0.950X0.190	30 PIN SIMM
PEP25636	256KX36	4.25X1.0X0.190	72 PIN SIMM
PEP51236	256KX36	4.25X1.0X0.325	72 PIN SIMM
PEP1MX36	1MX36	4.25X1.00X0.190	72 PIN SIMM
PEP2MX36	2MX36	4.25X1.0X0.325	72 PIN SIMM
PEP4MX36	4MX36	4.6X1.3X0.325	72 PIN SIMM
PEP1MX33	1MX33	4.25X1.0X0.190	72 PIN SIMM
PEP2MX33	2MX33	4.25X1.0X0.325	72 PIN SIMM
PEP4MX33	4MX33	4.60X1.0X0.325	72 PIN SIMM
PEP1MX40	1MX40	4.25X1.0X0.190	72 PIN SIMM
PEP2MX40	2MX40	4.25X1.0X0.325	72 PIN SIMM
NTX4M	4MX8	3.55X0.810X0.190	64 PIN SIMM
NTX4000	1MX8	3.55X0.810X0.190	64 PIN SIMM
AST1000	256KX36	3.55X0.810X0.190	64 PIN SIMM
AST4000	1MX36	3.55X0.810X0.190	64 PIN SIMM

STATIC RAM MODULES — 30, 45, 55, 70, 100, 120 nS.

PART NUMBER	ORGANIZATION	DIMENSIONS	PKG.
S128KX8	128KX8 80, 100, 120	1.80X0.680	
S256KX8	256KX8 80, 100	1.70X0.620	
S512KX8	512KX8 80, 100	1.70X0.620	
1PE0176	256KX8 55, 70	2.60X0.620	
LI6432	64KX32 20-55 NS	3.00X0.620	
LI25632	256KX32 20-55 NS	3.00X0.620	

**CALL FOR 16MX9
4MX36
8MX36
SIMMS**

NOTES: *Also available in SIMM package. † Also available in 3 chip solution.

WE SUPPLY MEMORY UPGRADES FOR ALL (MOST) MODELS OF NOTEBOOK, LAPTOP, DESKTOP AND WORKSTATIONS FOR:

sun AST® COMPUTER IBM DELL™ ALR COMPAQ® ® ZENITH

80C31/80C51/87C51 – CMOS Single-Chip 8-Bit Microcontroller

DESCRIPTION

The Philips 80C31/80C51/87C51 is a high-performance microcontroller fabricated with Philips high-density CMOS technology. The CMOS 8XC51 is functionally compatible with the NMOS 8031/8051 microcontrollers. The Philips CMOS technology combines the high speed and density characteristics of HMOS with the low power attributes of CMOS. Philips epitaxial substrate minimizes latch-up sensitivity.

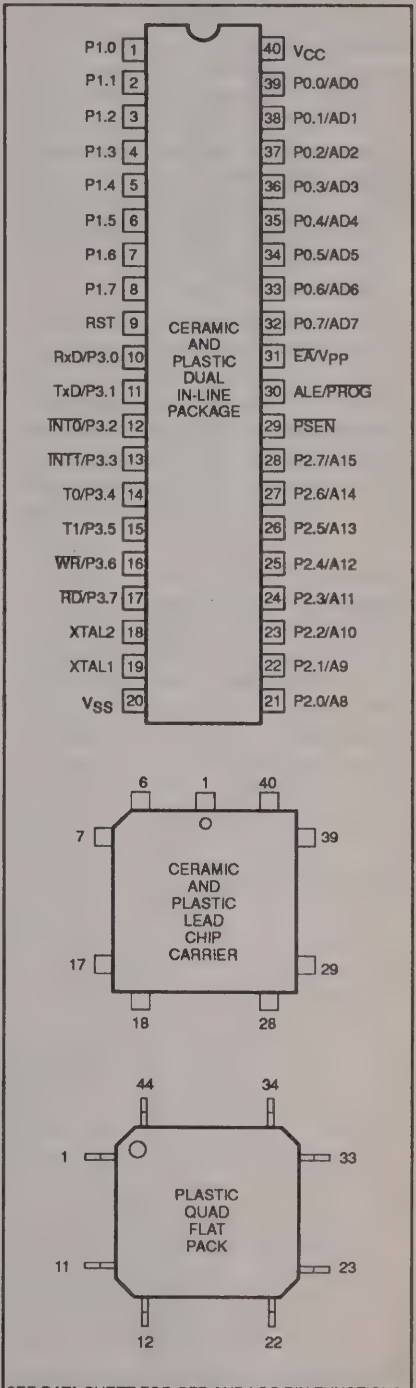
The 8XC51 contains a 4k × 8 ROM (80C51) EPROM (87C51), a 128 × 8 RAM, 32 I/O lines, two 16-bit counter/timers, a five-source, two-priority level nested interrupt structure, a serial I/O port for either multi-processor communications, I/O expansion or full duplex UART, and on-chip oscillator and clock circuits.

In addition, the device has two software selectable modes of power reduction—idle mode and power-down mode. The idle mode freezes the CPU while allowing the RAM, timers, serial port, and interrupt system to continue functioning. The power-down mode saves the RAM contents but freezes the oscillator, causing all other chip functions to be inoperative.

FEATURES

- 8031/8051 compatible
  - 4k × 8 ROM (80C51)
  - 4k × 8 EPROM (87C51)
  - ROMless (80C31)
  - 128 × 8 RAM
  - Two 16-bit counter/timers
  - Full duplex serial channel
  - Boolean processor
- Memory addressing capability
  - 64k ROM and 64k RAM
- Power control modes:
  - Idle mode
  - Power-down mode
- CMOS and TTL compatible
- Five speed ranges at V_{CC} = 5V
  - 12MHz
  - 16MHz
  - 24MHz
  - 30MHz
  - 33MHz
- Five package styles
- Extended temperature ranges
- OTP package available

PIN CONFIGURATIONS


P1.0 1
P1.1 2
P1.2 3
P1.3 4
P1.4 5
P1.5 6
P1.6 7
P1.7 8
RST 9
RxD/P3.0 10
TxD/P3.1 11
INT0/P3.2 12
INT1/P3.3 13
T0/P3.4 14
T1/P3.5 15
WR/P3.6 16
RD/P3.7 17
XTAL2 18
XTAL1 19
VSS 20
40 VCC
39 P0.0/AD0
38 P0.1/AD1
37 P0.2/AD2
36 P0.3/AD3
35 P0.4/AD4
34 P0.5/AD5
33 P0.6/AD6
32 P0.7/AD7
31 EA/Vpp
30 ALE/PROG
29 PSEN
28 P2.7/A15
27 P2.6/A14
26 P2.5/A13
25 P2.4/A12
24 P2.3/A11
23 P2.2/A10
22 P2.1/A9
21 P2.0/A8
CERAMIC AND PLASTIC DUAL IN-LINE PACKAGE
6
1
40
7
39
17
29
18
28
CERAMIC AND PLASTIC LEAD CHIP CARRIER
44
34
1
33
11
23
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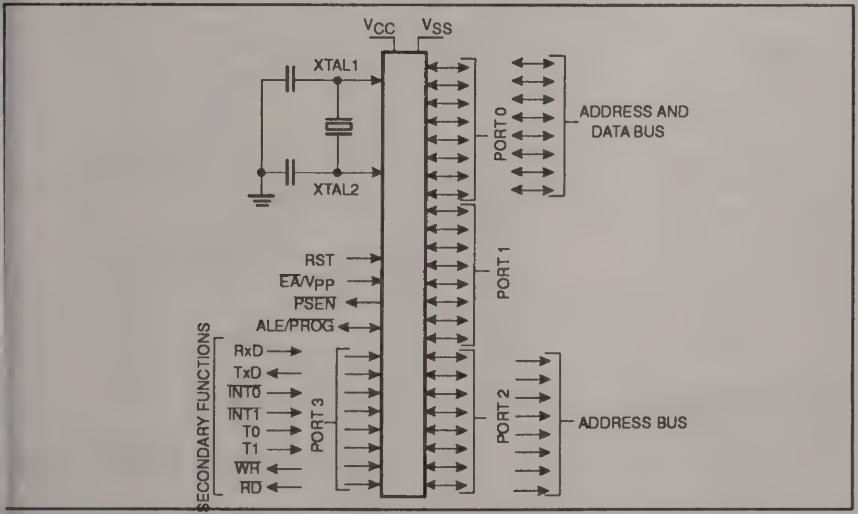
22
PLASTIC QUAD FLAT PACK

SEE DATA SHEET FOR QFP AND LCC PIN FUNCTIONS.

LOGIC SYMBOL


VCC
VSS
XTAL1
XTAL2
RST
EA/Vpp
PSEN
ALE/PROG
SECONDARY FUNCTIONS
RxD
TxD
INT0
INT1
T0
T1
WR
RD
PORT 3
PORT 0
ADDRESS AND DATA BUS
PORT 1
PORT 2
ADDRESS BUS

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Philips

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80C32/80C52/87C52 – CMOS Single-Chip 8-Bit Microcontroller

DESCRIPTION

The Philips 80C32/80C52/87C52 is a high-performance microcontroller fabricated with Philips high-density CMOS technology. The CMOS 8XC52 is functionally compatible with the NMOS SCN8032/8052 microcontrollers. The Philips CMOS technology combines the high speed and density characteristics of HMOS with the low power attributes of CMOS. Philips epitaxial substrate minimizes latch-up sensitivity.

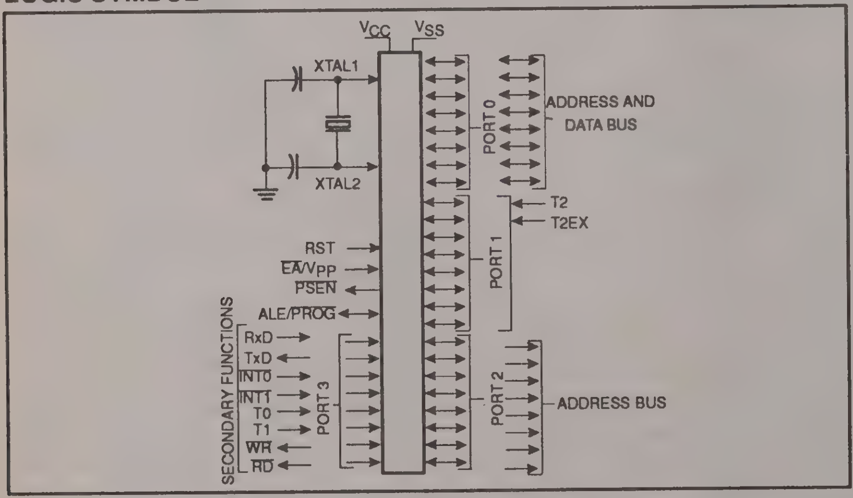
The 8XC52 contains an 8k × 8 ROM (80C52) EPROM (87C52), a 256 × 8 RAM, 32 I/O lines, three 16-bit counter/timers, a six-source, two-priority level nested interrupt structure, a serial I/O port for either multi-processor communications, I/O expansion or full duplex UART, and on-chip oscillator and clock circuits.

In addition, the 8XC52 has two software selectable modes of power reduction—idle mode and power-down mode. The idle mode freezes the CPU while allowing the RAM, timers, serial port, and interrupt system to continue functioning. The power-down mode saves the RAM contents but freezes the oscillator, causing all other chip functions to be inoperative.

FEATURES

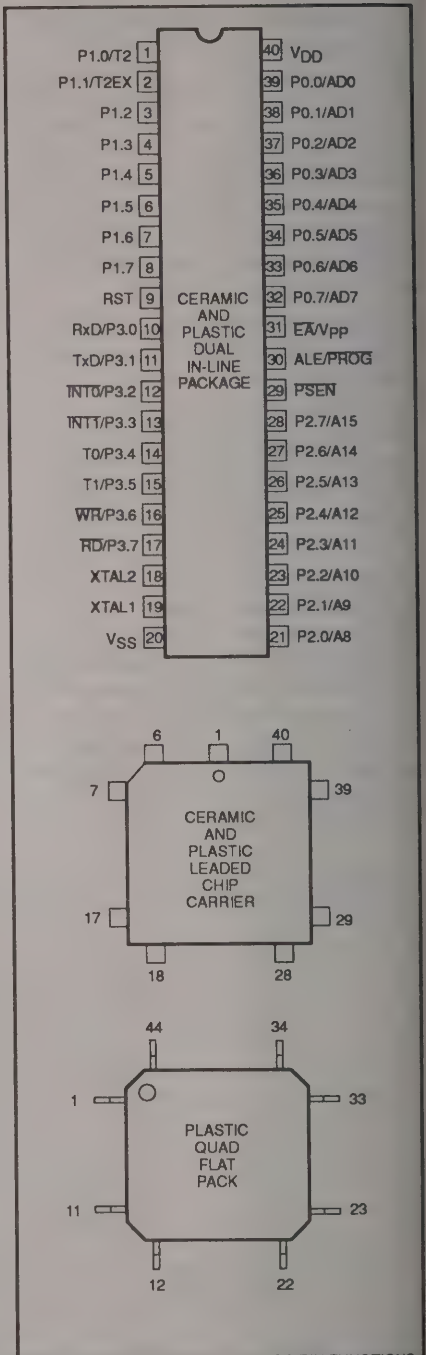
- 80C51 based architecture
- 8032/8052 compatible
  - 8k × 8 ROM (80C52)
  - 8k × 8 EPROM (87C52)
  - ROMless (80C32)
  - 256 × 8 RAM
  - Three 16-bit counter/timers
  - Full duplex serial channel
  - Boolean processor
- Memory addressing capability
  - 64k ROM and 64k RAM
- Power control modes:
  - Idle mode
  - Power-down mode
- CMOS and TTL compatible
- Two speed ranges:
  - 3.5 to 16MHz
  - 3.5 to 24MHz
- Five package styles
- Extended temperature ranges
- OTP package available

LOGIC SYMBOL



V_{CC} V_{SS}
XTAL1
XTAL2
RST
EA/Vpp
PSEN
ALE/PROG
SECONDARY FUNCTIONS
RxD
TxD
INT0
INT1
T0
T1
WR
RD
PORT 3
PORT 0
ADDRESS AND DATA BUS
PORT 1
T2
T2EX
PORT 2
ADDRESS BUS

PIN CONFIGURATIONS



P1.0/T2 1
P1.1/T2EX 2
P1.2 3
P1.3 4
P1.4 5
P1.5 6
P1.6 7
P1.7 8
RST 9
RxD/P3.0 10
TxD/P3.1 11
INT0/P3.2 12
INT1/P3.3 13
T0/P3.4 14
T1/P3.5 15
WR/P3.6 16
RD/P3.7 17
XTAL2 18
XTAL1 19
VSS 20
40 VDD
39 P0.0/AD0
38 P0.1/AD1
37 P0.2/AD2
36 P0.3/AD3
35 P0.4/AD4
34 P0.5/AD5
33 P0.6/AD6
32 P0.7/AD7
31 EA/Vpp
30 ALE/PROG
29 PSEN
28 P2.7/A15
27 P2.6/A14
26 P2.5/A13
25 P2.4/A12
24 P2.3/A11
23 P2.2/A10
22 P2.1/A9
21 P2.0/A8
CERAMIC AND PLASTIC DUAL IN-LINE PACKAGE
6
1
40
7
39
17
29
18
28
CERAMIC AND PLASTIC LEADED CHIP CARRIER
44
34
1
33
11
23
12
22
PLASTIC QUAD FLAT PACK

SEE DATA SHEET FOR QFP AND LCC PIN FUNCTIONS.

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80CL51 – Low-Voltage Single-Chip 8-Bit Microcontroller

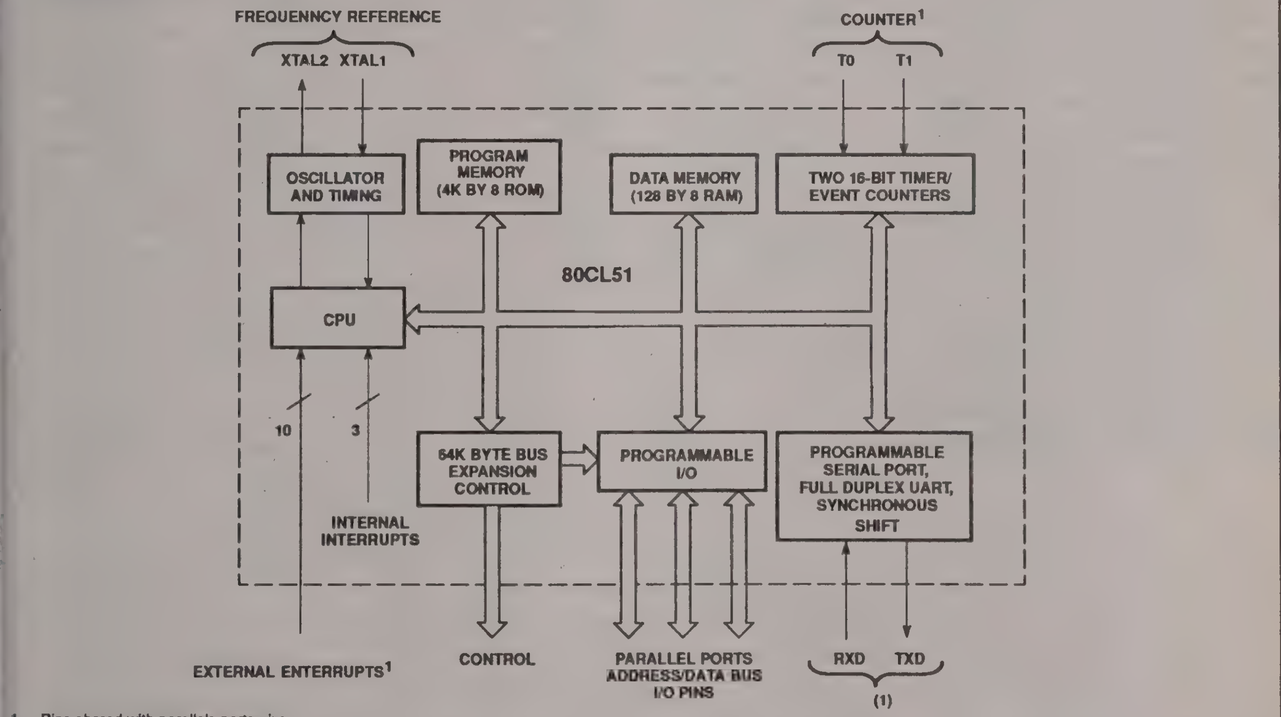
FEATURES

- Full static 80C51 CPU
- 8-bit CPU, ROM, RAM, 1/0 in a single 40-lead DIL / mini-pack
- 4K x 8 ROM, expandable externally to 64K bytes
- 128 bytes RAM, expandable externally to 64K bytes
- Four 8-bit ports, 321/0 lines
- Two 16-bit timer / event counters
- External memory expandable up to 128K, external ROM up to 64K and / or RAM up to 64K
- On-chip oscillator suitable for RC, LC, quartz crystal or ceramic resonator
- Thirteen source, thirteen vector interrupt structure with two priority levels
- Full duplex serial port (UART)
- Enhanced architecture with:
  - non-page oriented instructions
  - direct addressing
  - four eight byte RAM register banks
  - stack depth up to 128 bytes
  - multiply, divide, subtract and compare instructions
- Power-Down and IDLE instructions
- Wake-up via external interrupts at Port 1
- Single supply voltage of 1.8V to 6.0V
- Frequency range of 32 kHz to 12MHz
- Very low current consumption
- Operating temperature range: –40 to +85°C

DESCRIPTION

The 80CL51 is manufactured in an advanced CMOS technology. The instruction set of the 80CL51 is based on that of the 8051. The 80CL51 is a general purpose microcontroller especially suited for battery-powered application. The device has low power consumption and a wide range of supply voltage. For emulation purposes, the 85CL000 (Piggy-back version) with 256 bytes of RAM is recommended. The 80CL51 has two software selectable modes of reduced activity for further power reduction: Idle and Power-down. The 80CL51 also functions as an arithmetic processor having facilities for both binary and BCD arithmetic plus bit-handling capabilities. The instruction set consists of over 100 instructions: 49 one-byte, 46 two-byte, and 16 three-byte.

BLOCK DIAGRAM


FREQUENNCY REFERENCE
XTAL2
XTAL1
COUNTER¹
T0
T1
OSCILLATOR AND TIMING
PROGRAM MEMORY (4K BY 8 ROM)
DATA MEMORY (128 BY 8 RAM)
TWO 16-BIT TIMER/ EVENT COUNTERS
80CL51
CPU
10
3
INTERNAL INTERRUPTS
64K BYTE BUS EXPANSION CONTROL
PROGRAMMABLE I/O
PROGRAMMABLE SERIAL PORT, FULL DUPLEX UART, SYNCHRONOUS SHIFT
EXTERNAL ENTERRUPTS¹
CONTROL
PARALLEL PORTS ADDRESS/DATA BUS I/O PINS
RXD
TXD
(1)

1. Pins shared with parallels ports pins.

11/92–PRELIM

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80CL410/83CL410 – Low Voltage/Low Power Single-Chip 8-Bit Microcontroller with I^{2}C

DESCRIPTION

The 80CL410/83CL410 (hereafter generically referred to as 8XCL410) is manufactured in an advanced CMOS process that allows the part to operate at supply voltages down to 1.8V and oscillator frequencies down to DC. The 8XCL410 has the same instruction set as the 80C51.

The 8XCL410 features a 4k byte ROM (83CL410), 128 bytes RAM (both ROM and RAM are externally expandable to 64k bytes), four 8-bit ports, two 16-bit timer/counters, an I^{2}C serial interface, a thirteen source, two priority level nested interrupt structure, and on-chip oscillator circuitry suitable for quartz crystal, ceramic resonator, RC, or LC.

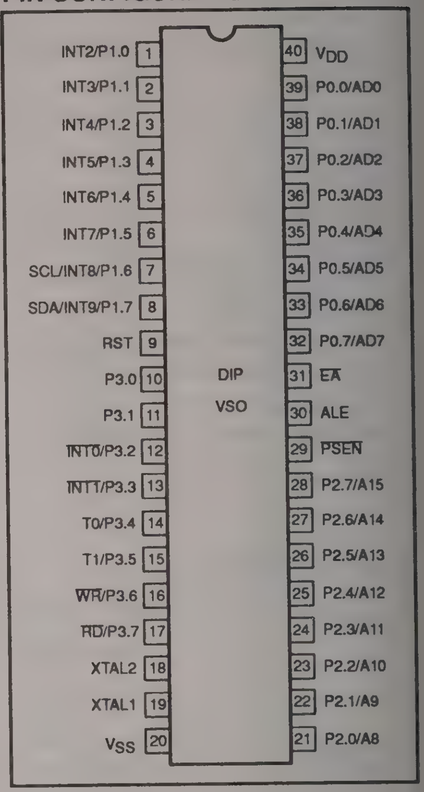
The 8XCL410 has two reduced power modes that are the same as those on the standard 80C51. The special reduced power feature of this part is that it can be stopped and then restarted. Running from an external clock source, the clock can be stopped and after a period of time restarted. The 8XCL410 will resume operation from where it was when the code stopped with no loss of internal state, RAM contents, or Special Function Register contents. If the internal oscillator is used the part cannot be stopped and started, but the power-down mode, which can be terminated via an interrupt, can be used to achieve similar power savings and then restart without loss of on-chip RAM and Special Function Register values.

Philips

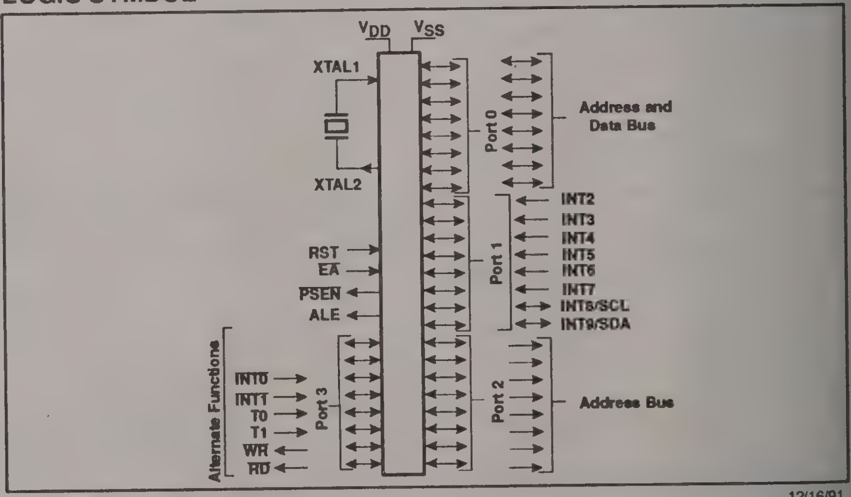
FEATURES

- Supply voltage from 1.8 to 6.0V
- Operating frequency from 32kHz to 12MHz
- 80C51 based architecture
  - 4k × 8 ROM (64k external)
  - 128 × 8 RAM (64k external)
  - Four 8-bit I/O ports
  - Two 16-bit timer/counters
  - A thirteen-source, two-level, nested priority interrupt structure
  - 10 external interrupts
- Fully static 80C51 CPU
- I^{2}C Serial Interface
- Two power control modes
  - Idle mode
  - Power-down mode – can be terminated by reset or external interrupt
- Wake-up via external interrupts at port 1
- On-chip oscillator (quartz crystal, ceramic resonator, RC, LC)
- Very low power consumption
- Operating temperature range: –40 to +85°C

PIN CONFIGURATION


INT2/P1.0 1
INT3/P1.1 2
INT4/P1.2 3
INT5/P1.3 4
INT6/P1.4 5
INT7/P1.5 6
SCL/INT8/P1.6 7
SDA/INT9/P1.7 8
RST 9
P3.0 10
P3.1 11
INT0/P3.2 12
INT1/P3.3 13
T0/P3.4 14
T1/P3.5 15
WR/P3.6 16
RD/P3.7 17
XTAL2 18
XTAL1 19
VSS 20
DIP
VSO
40 VDD
39 P0.0/AD0
38 P0.1/AD1
37 P0.2/AD2
36 P0.3/AD3
35 P0.4/AD4
34 P0.5/AD5
33 P0.6/AD6
32 P0.7/AD7
31 EA
30 ALE
29 PSEN
28 P2.7/A15
27 P2.6/A14
26 P2.5/A13
25 P2.4/A12
24 P2.3/A11
23 P2.2/A10
22 P2.1/A9
21 P2.0/A8

LOGIC SYMBOL


VDD
VSS
XTAL1
XTAL2
RST
EA
PSEN
ALE
Port 0
Address and Data Bus
Port 1
INT2
INT3
INT4
INT5
INT6
INT7
INT8/SCL
INT9/SDA
Port 2
Address Bus
Port 3
Alternate Functions
INT0
INT1
T0
T1
WR
RD

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80C451/83C451/87C451 – CMOS Single-Chip 8-Bit Microcontroller

DESCRIPTION

The Philips 8XC451 is an I/O expanded single-chip microcontroller fabricated with Philips high-density CMOS technology. Philips epitaxial substrate minimizes latch-up sensitivity.

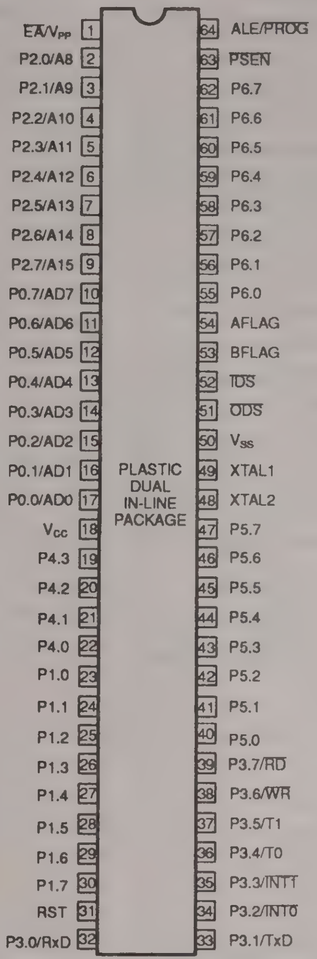
The 8XC451 is a functional extension of the 87C51 microcontroller with three additional I/O ports and four I/O control lines. The LCC version has a total of 68 pins. Four control lines associated with port 6 facilitate high-speed asynchronous I/O functions.

The 8XC451 includes a 4k × 8 ROM (83C451) EPROM (87C451), a 128 × 8 RAM, 56 (LCC) or 52 (DIP) I/O lines, two 16-bit timer/counters, a five source, two priority level, nested interrupt structure, a serial I/O port for either a full duplex UART, I/O expansion, or muti-processor communications, and on-chip oscillator and clock circuits. The 80C451 includes all of the 83C451 features except the on-board 4k × 8 ROM.

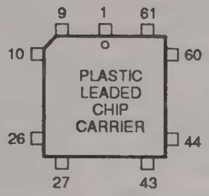
The 87C451 has 4k of EPROM on-chip as program memory and is otherwise identical to the 83C451.

The 8XC451 has two software selectable modes of reduced activity for further power reduction; idle mode and power-down mode. Idle mode freezes the CPU while allowing the RAM, timers, serial port, and interrupt system to continue functioning. Power-down mode freezes the oscillator, causing all other chip functions to be inoperative while maintaining the RAM contents.

PIN CONFIGURATIONS



$\overline{EA}$/V_{PP} 1
P2.0/A8 2
P2.1/A9 3
P2.2/A10 4
P2.3/A11 5
P2.4/A12 6
P2.5/A13 7
P2.6/A14 8
P2.7/A15 9
P0.7/AD7 10
P0.6/AD6 11
P0.5/AD5 12
P0.4/AD4 13
P0.3/AD3 14
P0.2/AD2 15
P0.1/AD1 16
P0.0/AD0 17
V_{CC} 18
P4.3 19
P4.2 20
P4.1 21
P4.0 22
P1.0 23
P1.1 24
P1.2 25
P1.3 26
P1.4 27
P1.5 28
P1.6 29
P1.7 30
RST 31
P3.0/RxD 32
64 ALE/$\overline{PROG}$
63 $\overline{PSEN}$
62 P6.7
61 P6.6
60 P6.5
59 P6.4
58 P6.3
57 P6.2
56 P6.1
55 P6.0
54 AFLAG
53 BFLAG
52 $\overline{IDS}$
51 $\overline{ODS}$
50 V_{SS}
49 XTAL1
48 XTAL2
47 P5.7
46 P5.6
45 P5.5
44 P5.4
43 P5.3
42 P5.2
41 P5.1
40 P5.0
39 P3.7/$\overline{RD}$
38 P3.6/$\overline{WR}$
37 P3.5/T1
36 P3.4/T0
35 P3.3/$\overline{INT1}$
34 P3.2/$\overline{INT0}$
33 P3.1/TxD
PLASTIC DUAL IN-LINE PACKAGE



9
1
61
10
60
26
44
27
43
PLASTIC LEADED CHIP CARRIER

Pin	Function	Pin	Function
1	$\overline{EA}$/V_{PP}	35	RST
2	P2.0/A8	36	P3.0/RxD
3	P2.1/A9	37	P3.1/TxD
4	P2.2/A10	38	P3.2/$\overline{INT0}$
5	P2.3/A11	39	P3.3/$\overline{INT1}$
6	P2.4/A12	40	P3.4/T0
7	P2.5/A13	41	P3.5/T1
8	P2.6/A14	42	P3.6/$\overline{WR}$
9	P2.7/A15	43	P3.7/$\overline{RD}$
10	P0.7/AD7	44	P5.0
11	P0.6/AD6	45	P5.1
12	P0.5/AD5	46	P5.2
13	P0.4/AD4	47	P5.3
14	P0.3/AD3	48	P5.4
15	P0.2/AD2	49	P5.5
16	P0.1/AD1	50	P5.6
17	P0.0/AD0	51	P5.7
18	V_{CC}	52	XTAL2
19	P4.7	53	XTAL1
20	P4.6	54	V_{SS}
21	P4.5	55	$\overline{ODS}$
22	P4.4	56	$\overline{IDS}$
23	P4.3	57	BFLAG
24	P4.2	58	AFLAG
25	P4.1	59	P6.0
26	P4.0	60	P6.1
27	P1.0	61	P6.2
28	P1.1	62	P6.3
29	P1.2	63	P6.4
30	P1.3	64	P6.5
31	P1.4	65	P6.6
32	P1.5	66	P6.7
33	P1.6	67	$\overline{PAEN}$
34	P1.7	68	ALE/$\overline{PROG}$

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FEATURES

- 80C51 based architecture
- 68-pin LCC and 64-pin DIP packages:
  - Seven 8-bit I/O ports (LCC version)
  - Six 8-bit ports and one 4-bit port (DIP version)
- Port 6 features:
  - Eight data pins
  - Four control pins
  - Direct MPU bus interface
  - Parallel printer interface
- On the microcontroller:
  - 4k × 8 ROM (83C451)
    4k × 8 EPROM (87C451)
    ROMless version (80C451)
  - 128 × 8 RAM
  - Two 16-bit counter/timers
  - Two external interrupts
- External memory addressing capability
  - 64k ROM and 64k RAM
- Low power consumption:
  - Normal operation: less than 24mA at 5V, 12MHz
  - Idle mode
  - Power-down mode

Philips Semiconductors

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87C524 – CMOS Single-Chip 8-Bit Microcontroller

DESCRIPTION

The 87C524 single-chip 8-bit microcontroller is manufactured in an advanced CMOS process and is a derivative of the 80C51 microcontroller family. The 87C524 has the same instruction set as the 80C51.

This device provides architectural enhancements that make it applicable in a variety of applications in consumer, telecom and general control systems, especially in those systems which need large ROM and RAM capacity on-chip.

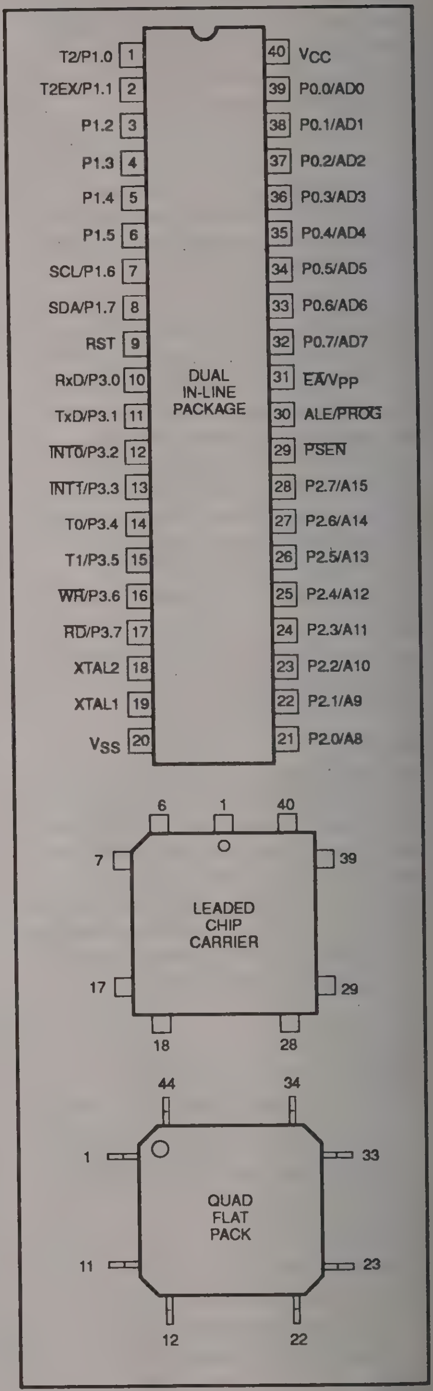
The 87C524 contains a 16k × 8 EPROM, a 512 × 8 RAM, four 8-bit I/O ports, two 16-bit timer/event counters (identical to the timers of the 80C51), a 16-bit timer (identical to the timer 2 of the 80C52), a watchdog timer with a separate oscillator, a multi-source, two-priority-level, nested interrupt structure, two serial interfaces (UART and I^{2}C-bus), and on-chip oscillator and timing circuits.

In addition, the 87C524 has two software selectable modes of power reduction—idle mode and power-down mode. The idle mode freezes the CPU while allowing the RAM, timers, serial port, and interrupt system to continue functioning. The power-down mode saves the RAM contents but freezes the oscillator, causing all other chip functions to be inoperative.

FEATURES

- 80C51 instruction set
  - 16k × 8 EPROM
  - 512 × 8 RAM
  - Memory addressing capability 64k ROM and 64k RAM
  - Three 16-bit counter/timers
  - On-chip watchdog timer with oscillator
  - Full duplex UART
  - I^{2}C serial interface
- Power control modes:
  - Idle mode
  - Power-down mode
  - Warm start from power-down
- CMOS and TTL compatible
- Two speed ranges at V_{CC} = 5V ±10%
  - 3.5 to 16MHz
  - 3.5 to 20MHz
- Extended temperature ranges
- OTP package available
- EPROM code protection

PIN CONFIGURATIONS


T2/P1.0 1
T2EX/P1.1 2
P1.2 3
P1.3 4
P1.4 5
P1.5 6
SCL/P1.6 7
SDA/P1.7 8
RST 9
RxD/P3.0 10
TxD/P3.1 11
INT0/P3.2 12
INT1/P3.3 13
T0/P3.4 14
T1/P3.5 15
WR/P3.6 16
RD/P3.7 17
XTAL2 18
XTAL1 19
VSS 20
40 VCC
39 P0.0/AD0
38 P0.1/AD1
37 P0.2/AD2
36 P0.3/AD3
35 P0.4/AD4
34 P0.5/AD5
33 P0.6/AD6
32 P0.7/AD7
31 EA/VPP
30 ALE/PROG
29 PSEN
28 P2.7/A15
27 P2.6/A14
26 P2.5/A13
25 P2.4/A12
24 P2.3/A11
23 P2.2/A10
22 P2.1/A9
21 P2.0/A8
DUAL IN-LINE PACKAGE
6
1
40
7
39
LEADED CHIP CARRIER
17
29
18
28
44
34
1
33
QUAD FLAT PACK
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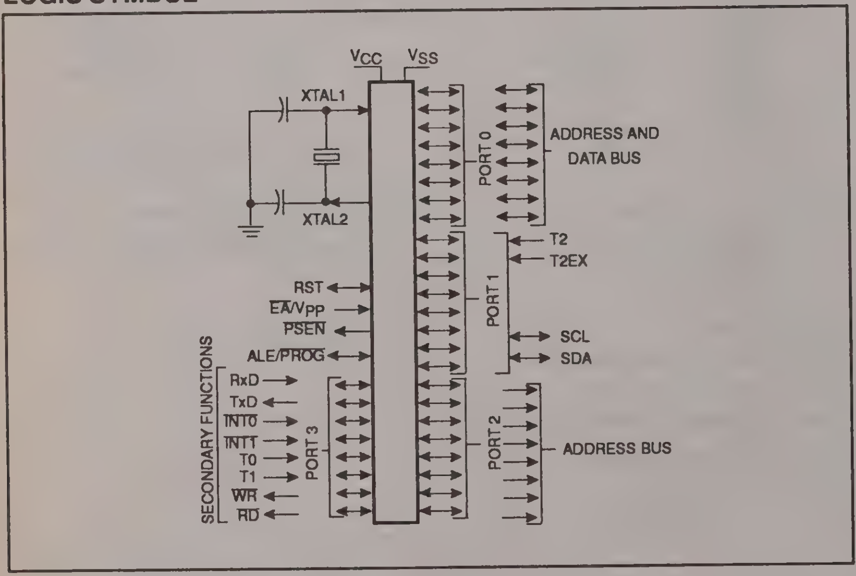
01/07/93

LOGIC SYMBOL


VCC
VSS
XTAL1
XTAL2
PORT 0
ADDRESS AND DATA BUS
PORT 1
T2
T2EX
SCL
SDA
RST
EA/VPP
PSEN
ALE/PROG
SECONDARY FUNCTIONS
RxD
TxD
INT0
INT1
T0
T1
WR
RD
PORT 3
PORT 2
ADDRESS BUS

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87C528 – CMOS Single-Chip 8-Bit Microcontroller

DESCRIPTION

The 87C528 single-chip 8-bit microcontroller is manufactured in an advanced CMOS process and is a derivative of the 80C51 microcontroller family. The 87C528 has the same instruction set as the 80C51. Three versions of the derivative exist:

- 83C528—32k bytes mask programmable ROM
- 80C528—ROMless version of the 83C528
- 87C528—32k bytes EPROM

This device provides architectural enhancements that make it applicable in a variety of applications in consumer, telecom and general control systems, especially in those systems which need large ROM and RAM capacity on-chip.

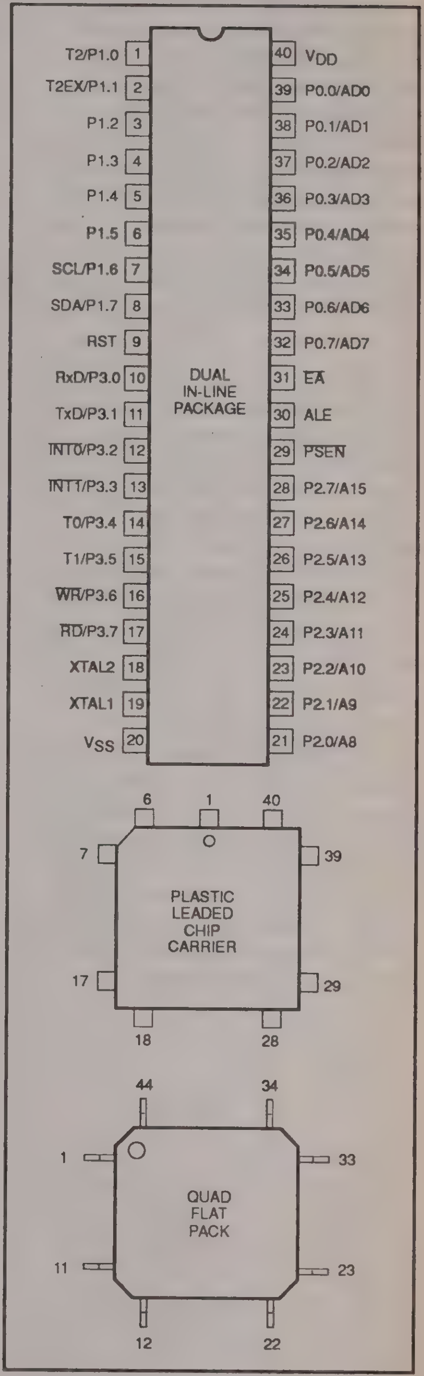
The 87C528 contains a 32k × 8 EPROM, a 512 × 8 RAM, four 8-bit I/O ports, two 16-bit timer/event counters (identical to the timers of the 80C51), a 16-bit timer (identical to the timer 2 of the 80C52), a watchdog timer with a separate oscillator, a multi-source, two-priority-level, nested interrupt structure, two serial interfaces (UART and I^{2}C-bus), and on-chip oscillator and timing circuits.

In addition, the 87C528 has two software selectable modes of power reduction—idle mode and power-down mode. The idle mode freezes the CPU while allowing the RAM, timers, serial port, and interrupt system to continue functioning. The power-down mode saves the RAM contents but freezes the oscillator, causing all other chip functions to be inoperative.

FEATURES

- 80C51 instruction set
  - 32k × 8 EPROM
  - 512 × 8 RAM
  - Memory addressing capability 64k ROM and 64k RAM
  - Three 16-bit counter/timers
  - On-chip watchdog timer with oscillator
  - Full duplex UART
  - I^{2}C serial interface
- Power control modes:
  - Idle mode
  - Power-down mode
  - Warm start from power-down
- CMOS and TTL compatible
- Extended temperature ranges
- EPROM code protection
- OTP package available
- Two speed ranges at V_{CC} = 5V
  - 16MHz
  - 20MHz

PIN CONFIGURATIONS



T2/P1.0 1
T2EX/P1.1 2
P1.2 3
P1.3 4
P1.4 5
P1.5 6
SCL/P1.6 7
SDA/P1.7 8
RST 9
RxD/P3.0 10
TxD/P3.1 11
$\overline{\text{INT0}}$/P3.2 12
$\overline{\text{INT1}}$/P3.3 13
T0/P3.4 14
T1/P3.5 15
$\overline{\text{WR}}$/P3.6 16
$\overline{\text{RD}}$/P3.7 17
XTAL2 18
XTAL1 19
V_{SS} 20
40 V_{DD}
39 P0.0/AD0
38 P0.1/AD1
37 P0.2/AD2
36 P0.3/AD3
35 P0.4/AD4
34 P0.5/AD5
33 P0.6/AD6
32 P0.7/AD7
31 $\overline{\text{EA}}$
30 ALE
29 $\overline{\text{PSEN}}$
28 P2.7/A15
27 P2.6/A14
26 P2.5/A13
25 P2.4/A12
24 P2.3/A11
23 P2.2/A10
22 P2.1/A9
21 P2.0/A8
DUAL IN-LINE PACKAGE
6 1 40 7 39 17 29 18 28
PLASTIC LEADED CHIP CARRIER
44 34 1 33 11 23 12 22
QUAD FLAT PACK

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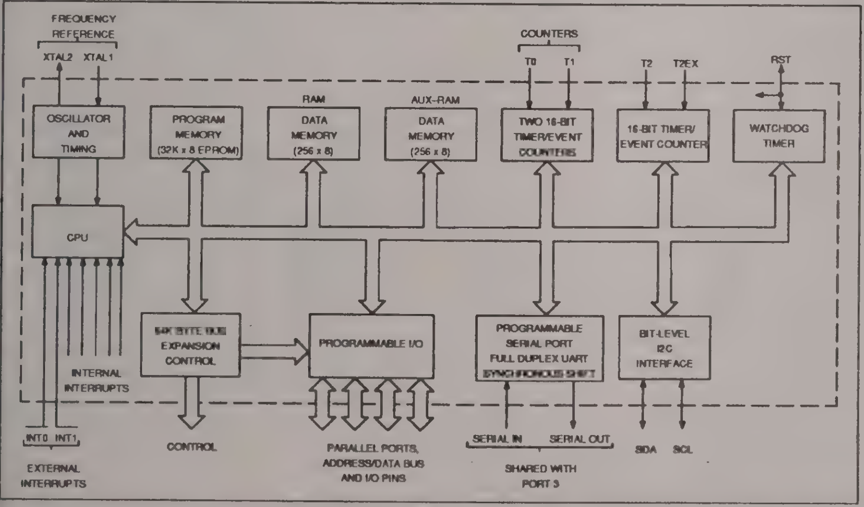
BLOCK DIAGRAM



FREQUENCY REFERENCE
XTAL2 XTAL1
COUNTERS
T0 T1
T2 T2EX
RST
OSCILLATOR AND TIMING
PROGRAM MEMORY (32K x 8 EPROM)
RAM
DATA MEMORY (256 x 8)
AUX-RAM
DATA MEMORY (256 x 8)
TWO 16-BIT TIMER/EVENT COUNTERS
16-BIT TIMER/ EVENT COUNTER
WATCHDOG TIMER
CPU
64K BYTE BUS EXPANSION CONTROL
PROGRAMMABLE I/O
PROGRAMMABLE SERIAL PORT FULL DUPLEX UART SYNCHRONOUS SHIFT
BIT-LEVEL I2C INTERFACE
INTERNAL INTERRUPTS
INT0 INT1
EXTERNAL INTERRUPTS
CONTROL
PARALLEL PORTS, ADDRESS/DATA BUS AND I/O PINS
SERIAL IN SERIAL OUT
SHARED WITH PORT 3
SDA SCL

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80C550/83C550/87C550 – CMOS Single-Chip 8-Bit Microcontroller with A/D and Watchdog Timer

DESCRIPTION

The Philips 8XC550 is a high-performance microcontroller fabricated with Philips high-density CMOS technology. This Philips CMOS technology combines the high speed and density characteristics of HMOS with the low power attributes of CMOS. Philips epitaxial substrate minimizes latch-up sensitivity. The CMOS 8XC550 has the same instruction set as the 80C51.

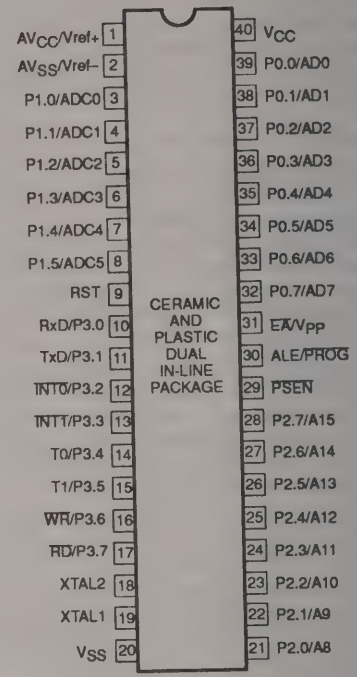
The 8XC550 contains a 4k × 8 EPROM (87C550)/ROM (83C550)/ROMless (80C550 has no program memory on-chip), a 128 × 8 RAM, 8 channels of 8-bit A/D, four 8-bit ports (port 1 is input only), a watchdog timer, two 16-bit counter/timers, a seven-source, two-priority level nested interrupt structure, a serial I/O port for either multi-processor communications, I/O expansion or full duplex UART, and an on-chip oscillator and clock circuits.

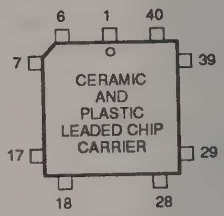
In addition, the 8XC550 has two software selectable modes of power reduction—idle mode and power-down mode. The idle mode freezes the CPU while allowing the RAM, timers, serial port, and interrupt system to continue functioning. The power-down mode saves the RAM contents but freezes the oscillator, causing all other chip functions to be inoperative.

FEATURES

- 80C51 based architecture
  - 4k × 8 EPROM (87C550)/ ROM (83C550)
  - 128 × 8 RAM
  - Eight channels of 8-bit A/D
  - Two 16-bit counter/timers
  - Watchdog timer
  - Full duplex serial channel
  - Boolean processor
- Memory addressing capability
  - 64k ROM and 64k RAM
- Power control modes:
  - Idle mode
  - Power-down mode
- CMOS and TTL compatible
- One speed range at $V_{CC} = 5V \pm 10\%$
  - 3.5 to 16MHz
- Four package styles
- Extended temperature ranges
- OTP package available

PIN CONFIGURATIONS


AV$_{CC}$/Vref+ 1
AV$_{SS}$/Vref– 2
P1.0/ADC0 3
P1.1/ADC1 4
P1.2/ADC2 5
P1.3/ADC3 6
P1.4/ADC4 7
P1.5/ADC5 8
RST 9
RxD/P3.0 10
TxD/P3.1 11
$\overline{\text{INT0}}$/P3.2 12
$\overline{\text{INT1}}$/P3.3 13
T0/P3.4 14
T1/P3.5 15
$\overline{\text{WR}}$/P3.6 16
$\overline{\text{RD}}$/P3.7 17
XTAL2 18
XTAL1 19
V$_{SS}$ 20
CERAMIC AND PLASTIC DUAL IN-LINE PACKAGE
40 V$_{CC}$
39 P0.0/AD0
38 P0.1/AD1
37 P0.2/AD2
36 P0.3/AD3
35 P0.4/AD4
34 P0.5/AD5
33 P0.6/AD6
32 P0.7/AD7
31 $\overline{\text{EA}}$/V$_{PP}$
30 ALE/$\overline{\text{PROG}}$
29 $\overline{\text{PSEN}}$
28 P2.7/A15
27 P2.6/A14
26 P2.5/A13
25 P2.4/A12
24 P2.3/A11
23 P2.2/A10
22 P2.1/A9
21 P2.0/A8


6
1
40
7
39
CERAMIC AND PLASTIC LEADED CHIP CARRIER
17
29
18
28

Pin	Function	Pin	Function	Pin	Function
1	AV$_{CC}$	16	P3.2/$\overline{\text{INT0}}$	31	P2.6/A14
2	Vref+	17	P3.3/$\overline{\text{INT1}}$	32	P2.7/A15
3	Vref–	18	P3.4/T0	33	$\overline{\text{PSEN}}$
4	AV$_{SS}$	19	P3.5/T1	34	ALE/$\overline{\text{PROG}}$
5	P1.0/ADC0	20	P3.6/$\overline{\text{WR}}$	35	$\overline{\text{EA}}$/V$_{PP}$
6	P1.1/ADC1	21	P3.7/$\overline{\text{RD}}$	36	P0.7/AD7
7	P1.2/ADC2	22	XTAL2	37	P0.6/AD6
8	P1.3/ADC3	23	XTAL1	38	P0.5/AD5
9	P1.4/ADC4	24	V$_{SS}$	39	P0.4/AD4
10	P1.5/ADC5	25	P2.0/A8	40	P0.3/AD3
11	P1.6/ADC6	26	P2.1/A9	41	P0.2/AD2
12	P1.7/ADC7	27	P2.2/A10	42	P0.1/AD1
13	RST	28	P2.3/A11	43	P0.0/AD0
14	P3.0/RxD	29	P2.4/A12	44	V$_{CC}$
15	P3.1/TxD	30	P2.5/A13		

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7C552 – Single-Chip 8-Bit Microcontroller

ESCRIPTION

he 87C552 Single-Chip 8-Bit licrocontroller is manufactured in an dvanced CMOS process and is a lerivative of the 80C51 microcontroller amily. The 87C552 has the same nstruction set as the 80C51. Three ersions of the derivative exist:

- 83C552—8k bytes mask programmable ROM
- 80C552—ROMless version of the 83C552
- 87C552—8k bytes EPROM

he 87C552 contains a 8k × 8 a volatile 56 × 8 read/write data memory, five -bit I/O ports, one 8-bit input port, two 6-bit timer/event counters (identical to e timers of the 80C51), an additional 6-bit timer coupled to capture and ompare latches, a 15-source, wo-priority-level, nested interrupt tructure, an 8-input ADC, a dual DAC ulse width modulated interface, two erial interfaces (UART and I²C-bus), a watchdog" timer and on-chip oscillator nd timing circuits. For systems that quire extra capability, the 87C552 can e expanded using standard TTL ompatible memories and logic.

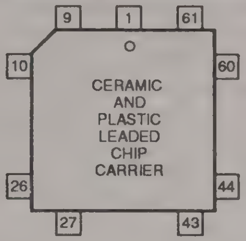
addition, the 87C552 has two oftware selectable modes of power duction—idle mode and power-down ode. The idle mode freezes the CPU hile allowing the RAM, timers, serial orts, and interrupt system to continue nctioning. The power-down mode aves the RAM contents but freezes the scillator, causing all other chip nctions to be inoperative.

e device also functions as an ithmetic processor having facilities for oth binary and BCD arithmetic plus t-handling capabilities. The instruction t consists of over 100 instructions: 49 e-byte, 45 two-byte, and 17 ree-byte. With a 16MHz (24MHz) ystal, 58% of the instructions are ecuted in 0.75µs (0.5µs) and 40% in 5µs (1µs). Multiply and divide structions require 3µs (2µs).

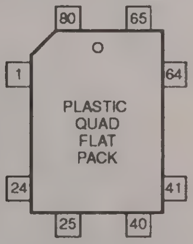
FEATURES

- 80C51 central processing unit
- 8k × 8 EPROM expandable externally to 64k bytes
- An additional 16-bit timer/counter coupled to four capture registers and three compare registers
- Two standard 16-bit timer/counters
- 256 × 8 RAM, expandable externally to 64k bytes
- Capable of producing eight synchronized, timed outputs
- A 10-bit ADC with eight multiplexed analog inputs
- Two 8-bit resolution, pulse width modulation outputs
- Five 8-bit I/O ports plus one 8-bit input port shared with analog inputs
- I²C-bus serial I/O port with byte oriented master and slave functions
- Full-duplex UART compatible with the standard 80C51
- On-chip watchdog timer
- Three speed ranges:
  – 16MHz
- Extended temperature ranges
- OTP package available

PIN CONFIGURATIONS



Pin	Function	Pin	Function
1	P5.0/ADC0	35	XTAL1
2	V_{DD}	36	V_{SS}
3	STADC	37	V_{SS}
4	$\overline{PWM0}$	38	NC
5	$\overline{PWM1}$	39	P2.0/A08
6	$\overline{EW}$	40	P2.1/A09
7	P4.0/CMSR0	41	P2.2/A10
8	P4.1/CMSR1	42	P2.3/A11
9	P4.2/CMSR2	43	P2.4/A12
10	P4.3/CMSR3	44	P2.5/A13
11	P4.4/CMSR4	45	P2.6/A14
12	P4.5/CMSR5	46	P2.7/A15
13	P4.6/CMT0	47	$\overline{PSEN}$
14	P4.7/CMT1	48	ALE/$\overline{PROG}$
15	RST	49	$\overline{EA}$/V_{PP}
16	P1.0/CT0I	50	P0.7/AD7
17	P1.1/CT1I	51	P0.6/AD6
18	P1.2/CT2I	52	P0.5/AD5
19	P1.3/CT3I	53	P0.4/AD4
20	P1.4/T2	54	P0.3/AD3
21	P1.5/RT2	55	P0.2/AD2
22	P1.6/SCL	56	P0.1/AD1
23	P1.7/SDA	57	P0.0/AD0
24	P3.0/RxD	58	AVref–
25	P3.1/TxD	59	AVref+
26	P3.2/$\overline{INT0}$	60	AV_{SS}
27	P3.3/$\overline{INT1}$	61	AV_{DD}
28	P3.4/T0	62	P5.7/ADC7
29	P3.5/T1	63	P5.6/ADC6
30	P3.6/$\overline{WR}$	64	P5.5/ADC5
31	P3.7/$\overline{RD}$	65	P5.4/ADC4
32	NC	66	P5.3/ADC3
33	NC	67	P5.2/ADC2
34	XTAL2	68	P5.1/ADC1



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80C575/83C575/87C575 – CMOS Single-Chip 8-Bit Microcontroller

DESCRIPTION

The Philips 80C575/83C575/87C575 is a high-performance microcontroller fabricated with Philips high-density CMOS technology. The Philips CMOS technology combines the high speed and density characteristics of HMOS with the low power attributes of CMOS. Philips epitaxial substrate minimizes latch-up sensitivity.

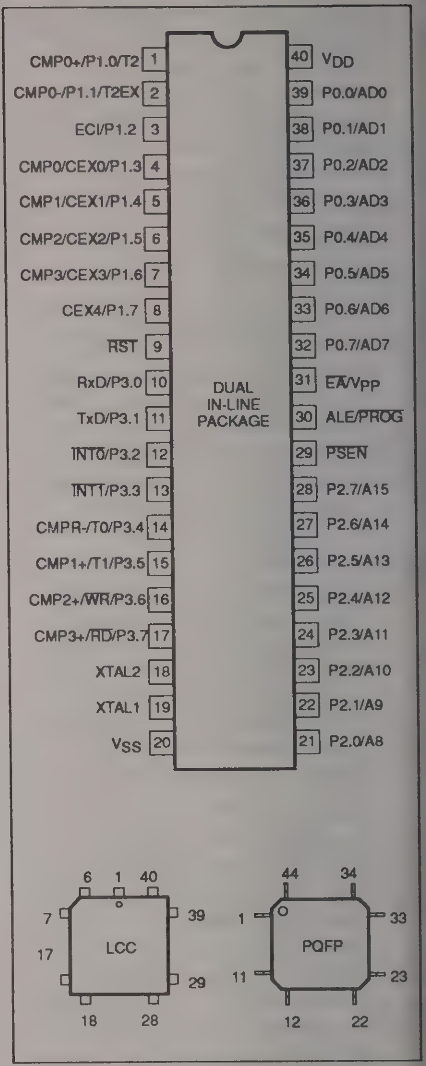
The 8XC575 contains an 8k × 8 ROM (83C575) EPROM (87C575), a 256 × 8 RAM, 32 I/O lines, three 16-bit counter/timers, a Programmable Counter Array (PCA), a seven-source, two-priority level nested interrupt structure, an enhanced UART, four analog comparators, power-fail detect and oscillator fail detect circuits, and on-chip oscillator and clock circuits.

In addition, the 8XC575 has a low active reset, and the port pins are reset to a low level. There is also a fully configurable watchdog timer, and internal power on clear circuit. The part includes idle mode and power-down mode states for reduced power consumption.

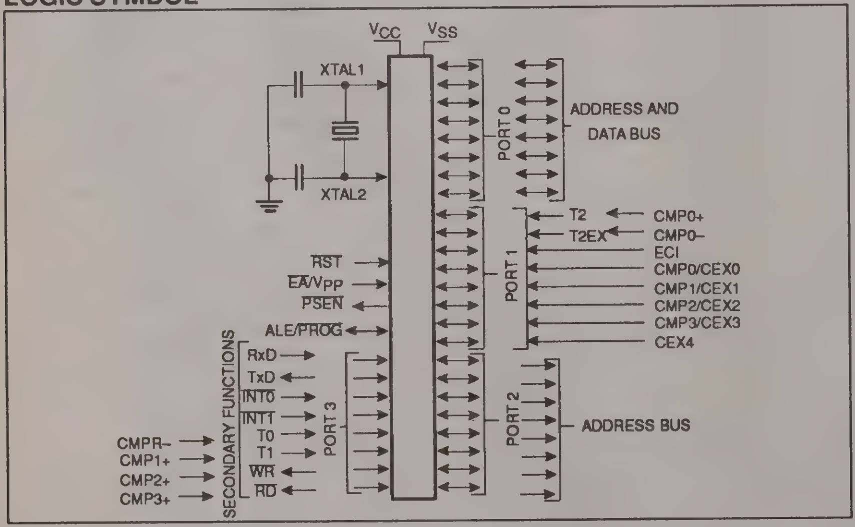
FEATURES

- 80C51 based architecture
  - 8k × 8 ROM (83C575)
  - 8k × 8 EPROM (87C575)
  - ROMless (80C575)
  - 256 × 8 RAM
  - Three 16-bit counter/timers
  - Programmable Counter Array
  - Enhanced UART
  - Boolean processor
  - Oscillator fail detect
  - Low active reset
  - Asynchronous low port reset
  - Schmitt trigger inputs
  - 4 analog comparators
  - Watchdog timer
  - Low V_{CC} detect
- Memory addressing capability
  - 64k ROM and 64k RAM
- Power control modes:
  - Idle mode
  - Power-down mode
- CMOS and TTL compatible
- 4.0 to 16MHz
- Extended temperature ranges
- OTP package available

PIN CONFIGURATIONS


CMP0+/P1.0/T2 1
CMP0-/P1.1/T2EX 2
ECI/P1.2 3
CMP0/CEX0/P1.3 4
CMP1/CEX1/P1.4 5
CMP2/CEX2/P1.5 6
CMP3/CEX3/P1.6 7
CEX4/P1.7 8
RST 9
RxD/P3.0 10
TxD/P3.1 11
INT0/P3.2 12
INT1/P3.3 13
CMPR-/T0/P3.4 14
CMP1+/T1/P3.5 15
CMP2+/WR/P3.6 16
CMP3+/RD/P3.7 17
XTAL2 18
XTAL1 19
VSS 20
40 VDD
39 P0.0/AD0
38 P0.1/AD1
37 P0.2/AD2
36 P0.3/AD3
35 P0.4/AD4
34 P0.5/AD5
33 P0.6/AD6
32 P0.7/AD7
31 EA/VPP
30 ALE/PROG
29 PSEN
28 P2.7/A15
27 P2.6/A14
26 P2.5/A13
25 P2.4/A12
24 P2.3/A11
23 P2.2/A10
22 P2.1/A9
21 P2.0/A8
DUAL IN-LINE PACKAGE
6 1 40
7 39
17 29
18 28
LCC
44 34
1 33
11 23
12 22
PQFP

LOGIC SYMBOL


VCC
VSS
XTAL1
XTAL2
PORT 0
ADDRESS AND DATA BUS
PORT 1
T2
T2EX
CMP0+
CMP0–
ECI
CMP0/CEX0
CMP1/CEX1
CMP2/CEX2
CMP3/CEX3
CEX4
RST
EA/VPP
PSEN
ALE/PROG
SECONDARY FUNCTIONS
RxD
TxD
INT0
INT1
T0
T1
WR
RD
CMPR–
CMP1+
CMP2+
CMP3+
PORT 3
PORT 2
ADDRESS BUS

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80CL580/83CL580 – Low-Voltage Single-Chip 8-Bit Microcontroller

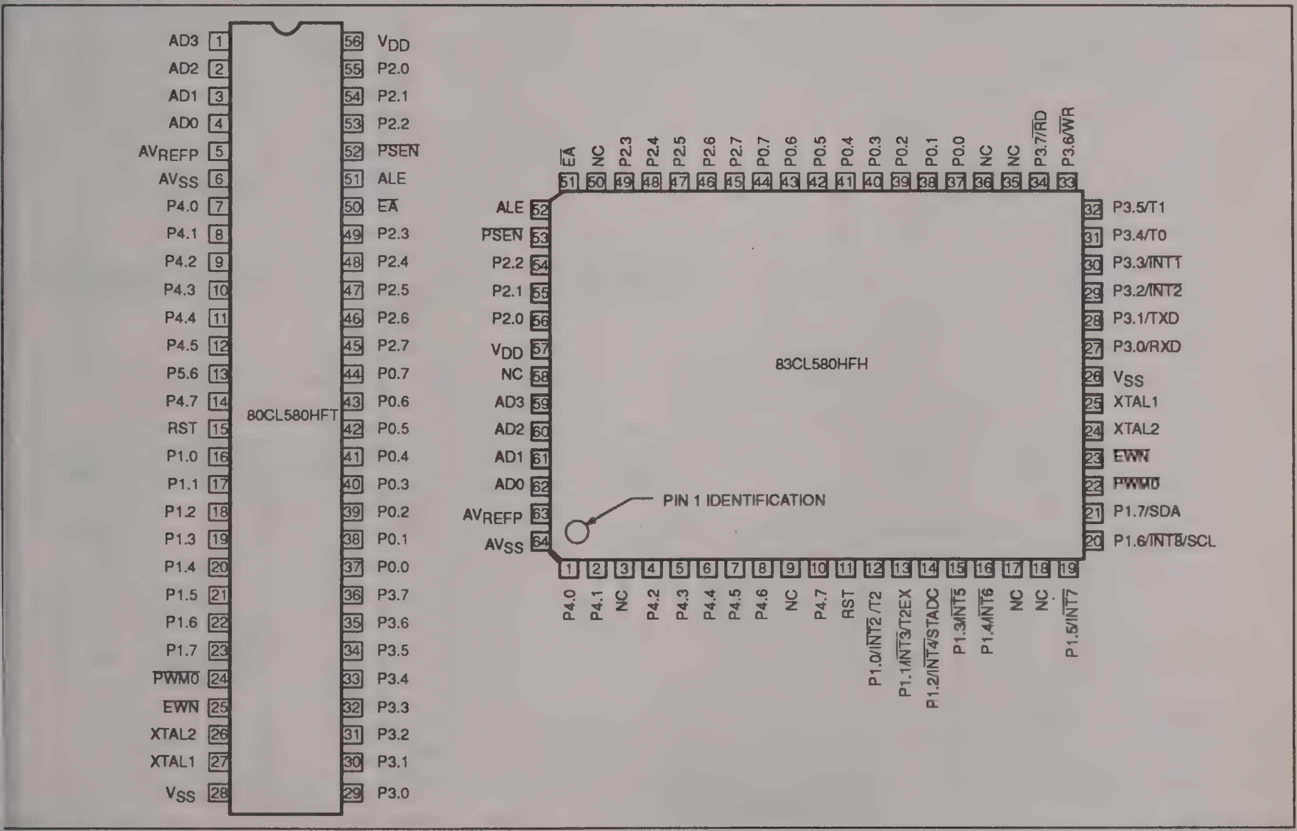
GENERAL DESCRIPTION

The 83CL580 is manufactured in an advanced CMOS technology. The instruction set of the 83CL580 is based on that of the 8051. The 83CL580 is an 8-bit general purpose microcontroller especially suited for cordless telephones and mobile communication applications. The device has low power consumption and a wide range of supply voltage. For emulation purposes, the 85CL580 (Piggy-back version) with 256 bytes of RAM is recommended. The 83CL580 has two software selectable modes of reduced activity for further power reduction: Idle and Power-down. The 83CL580 also functions as an arithmetic processor having facilities for both binary and BCD arithmetic plus bit-handling capabilities. The instruction set consists of over 100 instructions: 49 one-byte, 46 two-byte, and 16 three-byte.

FEATURES

- Full static 80C51 CPU
- 8-bit CPU, ROM, RAM, I/O in a single 56-lead VSO56 or 64-lead QFP64 package
- 6K × 8 ROM, expandable externally to 64K bytes
- 256 bytes RAM, expandable externally to 64K bytes
- Five 8-bit ports, 40 I/O lines
- Three 16-bit timer / event counters
- External memory expandable up to 128K, external ROM up to 64K and / or RAM up to 64K
- On-chip oscillator suitable for RC, LC, quartz crystal or ceramic resonator
- Fifteen source, fifteen vector interrupt structure with two priority levels
- Full duplex serial UART
- I^{2}C-bus interface for serial transfer on two lines
- A/D converter with power-down mode (8-bit, 4 inputs)
- Pulse width modulated output (8-bit resolution)
- Watchdog timer
- Enhanced architecture with:
  - non-page oriented instructions
  - four eight byte RAM register banks
  - direct addressing
  - multiply, divide, subtract and compare instructions
  - stack depth limited only by available internal RAM (max. 256 bytes)
- Power-Down and IDLE instructions
- Wake-up via external interrupts at Port 1
- Single supply voltage of 2.5V to 6.0V
- Frequency range of 32kHz to 12MHz
- Very low current consumption: typically 6mA at 3.5V / 8MHz
- Operating temperature range: –40 to +85°C

PIN CONFIGURATIONS


AD3 1
AD2 2
AD1 3
AD0 4
AVREFP 5
AVSS 6
P4.0 7
P4.1 8
P4.2 9
P4.3 10
P4.4 11
P4.5 12
P5.6 13
P4.7 14
RST 15
P1.0 16
P1.1 17
P1.2 18
P1.3 19
P1.4 20
P1.5 21
P1.6 22
P1.7 23
PWM0 24
EWN 25
XTAL2 26
XTAL1 27
VSS 28
56 VDD
55 P2.0
54 P2.1
53 P2.2
52 PSEN
51 ALE
50 EA
49 P2.3
48 P2.4
47 P2.5
46 P2.6
45 P2.7
44 P0.7
43 P0.6
42 P0.5
41 P0.4
40 P0.3
39 P0.2
38 P0.1
37 P0.0
36 P3.7
35 P3.6
34 P3.5
33 P3.4
32 P3.3
31 P3.2
30 P3.1
29 P3.0
80CL580HFT
EA 51
NC 50
P2.3 49
P2.4 48
P2.5 47
P2.6 46
P2.7 45
P0.7 44
P0.6 43
P0.5 42
P0.4 41
P0.3 40
P0.2 39
P0.1 38
P0.0 37
NC 36
NC 35
P3.7/RD 34
P3.6/WR 33
ALE 52
PSEN 53
P2.2 54
P2.1 55
P2.0 56
VDD 57
NC 58
AD3 59
AD2 60
AD1 61
AD0 62
AVREFP 63
AVSS 64
32 P3.5/T1
31 P3.4/T0
30 P3.3/INT1
29 P3.2/INT0
28 P3.1/TXD
27 P3.0/RXD
26 VSS
25 XTAL1
24 XTAL2
23 EWN
22 PWM0
21 P1.7/SDA
20 P1.6/INT8/SCL
83CL580HFH
PIN 1 IDENTIFICATION
1 P4.0
2 P4.1
3 NC
4 P4.2
5 P4.3
6 P4.4
7 P4.5
8 P4.6
9 NC
10 P4.7
11 RST
12 P1.0/INT2/T2
13 P1.1/INT3/T2EX
14 P1.2/INT4/STADC
15 P1.3/INT5
16 P1.4/INT6
17 NC
18 NC
19 P1.5/INT7

12/92-OBJECTIV

Philips Semiconductors

PHILIPS

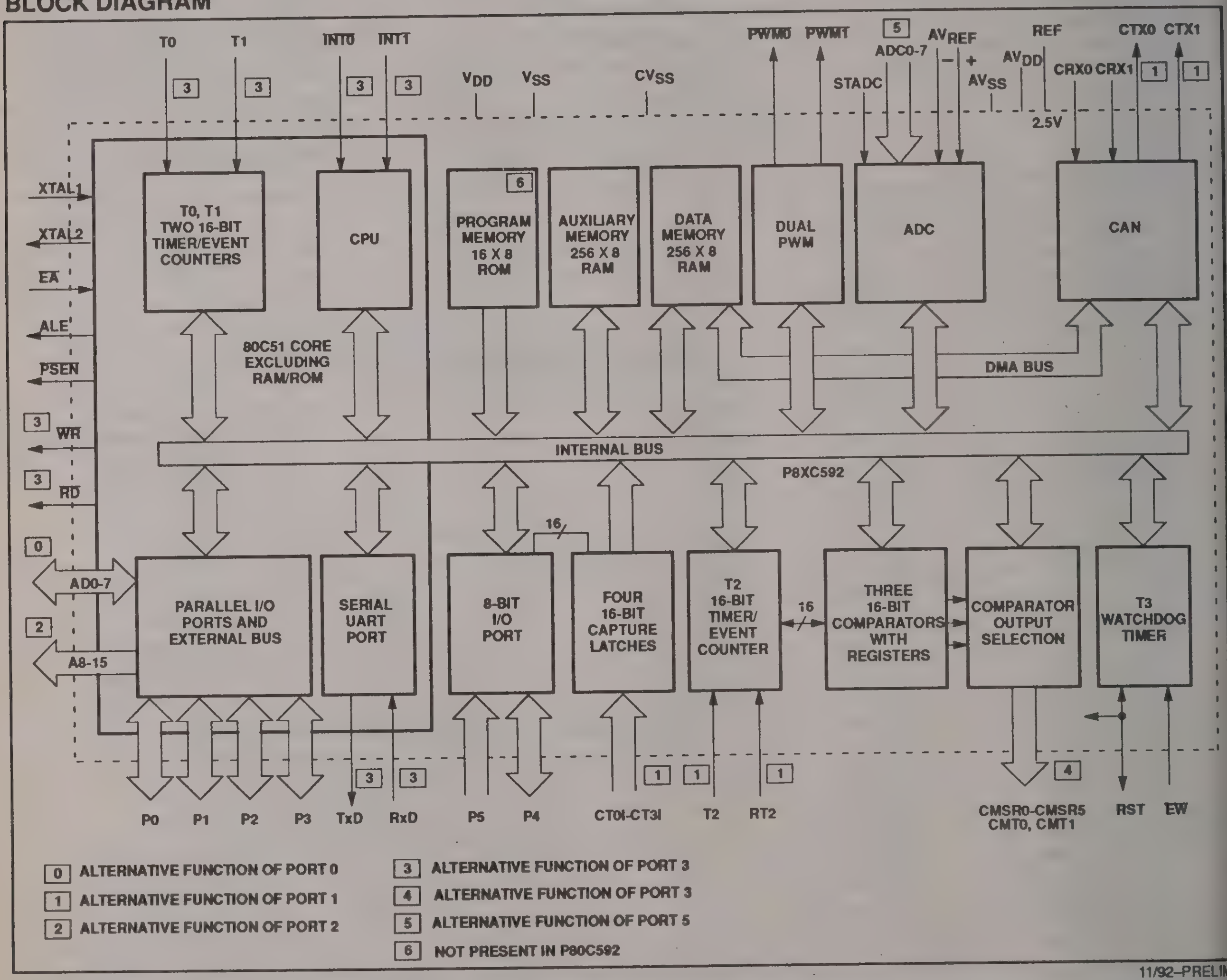
PHILIPS

80C592/83C592/87C592 – Single-Chip 8-Bit Microcontoller with CAN Controlle

FEATURES

- 80C51 core architecture
- 16k x 8 EPROM (87C592)
- 16k x 8 ROM (83C592)
- ROMless (80C592)
- 512 x 8 RAM expandable externally to 64k bytes
- Two standard 16-bit timer/counters
- An additional 16-bit timer/counter coupled to four capture registers and three compare registers
- A 10-bit ADC with eight multiplexed analog inputs
- Two 8-bit resolution pulse width modulation outputs
- 15 interrupt sources with 2 priority levels
- Five 8-bit I/O ports plus one 8-bit input port shared with analog inputs
- CAN controller with DMA transfer between internal data RAM and CAN registers
- Up to 1 Mbit/s CAN-controller with bus failure management facility
- $V_{DD}/2$ reference voltage
- Full-duplex UART compatible with the standard 80C51
- On-chip watchdog timer
- Extended temperature ranges (–40 to +125°C)
- OTP package available
- ROM code protection

BLOCK DIAGRAM


T0
T1
INT0
INT1
VDD
VSS
CVSS
PWM0
PWM1
5
ADC0-7
AVREF
STADC
AVDD
AVSS
REF
2.5V
CTX0
CTX1
CRX0
CRX1
1
3
6
XTAL1
XTAL2
EA
ALE
PSEN
WR
RD
0
2
T0, T1 TWO 16-BIT TIMER/EVENT COUNTERS
CPU
80C51 CORE EXCLUDING RAM/ROM
PROGRAM MEMORY 16 X 8 ROM
AUXILIARY MEMORY 256 X 8 RAM
DATA MEMORY 256 X 8 RAM
DUAL PWM
ADC
CAN
DMA BUS
INTERNAL BUS
P8XC592
16
AD0-7
A8-15
PARALLEL I/O PORTS AND EXTERNAL BUS
SERIAL UART PORT
8-BIT I/O PORT
FOUR 16-BIT CAPTURE LATCHES
T2 16-BIT TIMER/ EVENT COUNTER
THREE 16-BIT COMPARATORS WITH REGISTERS
COMPARATOR OUTPUT SELECTION
T3 WATCHDOG TIMER
4
P0
P1
P2
P3
TxD
RxD
P5
P4
CT0I-CT3I
T2
RT2
CMSR0-CMSR5 CMT0, CMT1
RST
EW
0 ALTERNATIVE FUNCTION OF PORT 0
1 ALTERNATIVE FUNCTION OF PORT 1
2 ALTERNATIVE FUNCTION OF PORT 2
3 ALTERNATIVE FUNCTION OF PORT 3
4 ALTERNATIVE FUNCTION OF PORT 3
5 ALTERNATIVE FUNCTION OF PORT 5
6 NOT PRESENT IN P80C592

11/92–PRELIM

Philips Semiconductors

PHILIPS

87C652 – CMOS Single-Chip 8-Bit Microcontroller

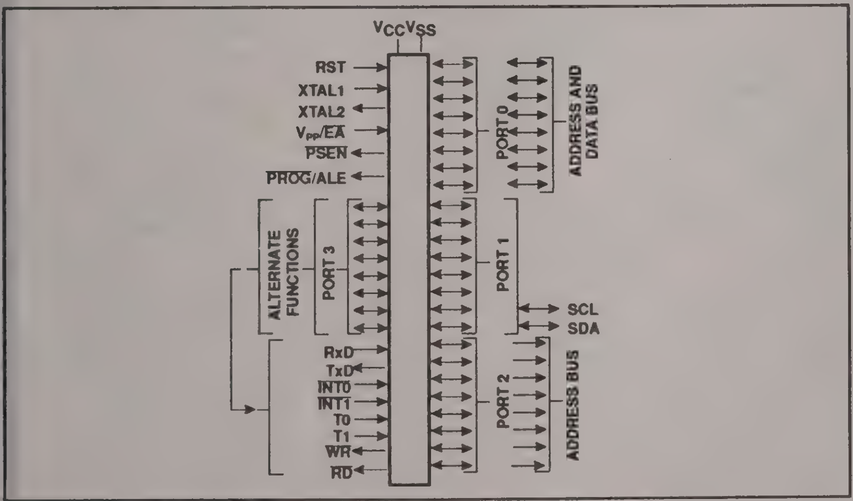
DESCRIPTION

The 87C652 Single-Chip 8-Bit Microcontroller is manufactured in an advanced CMOS process and is a derivative of the 80C51 microcontroller family. The 87C652 has the same instruction set as the 80C51.

This device provides architectural enhancements that make it applicable in a variety of applications for general control systems. The 87C652 contains a non-volatile 8k × 8 EPROM, a volatile 256 × 8 read/write data memory, four 8-bit I/O ports, two 16-bit timer/event counters (identical to the timers of the 80C51), a multi-source, two-priority-level, nested interrupt structure, an I²C interface, UART and on-chip oscillator and timing circuits. For systems that require extra capability, the 87C652 can be expanded using standard TTL compatible memories and logic.

The device also functions as an arithmetic processor having facilities for both binary and BCD arithmetic plus bit-handling capabilities. The instruction set consists of over 100 instructions: 49 one-byte, 45 two-byte and 17 three-byte. With a 16MHz crystal, 58% of the instructions are executed in 0.75µs and 40% in 1.5µs. Multiply and divide instructions require 3µs.

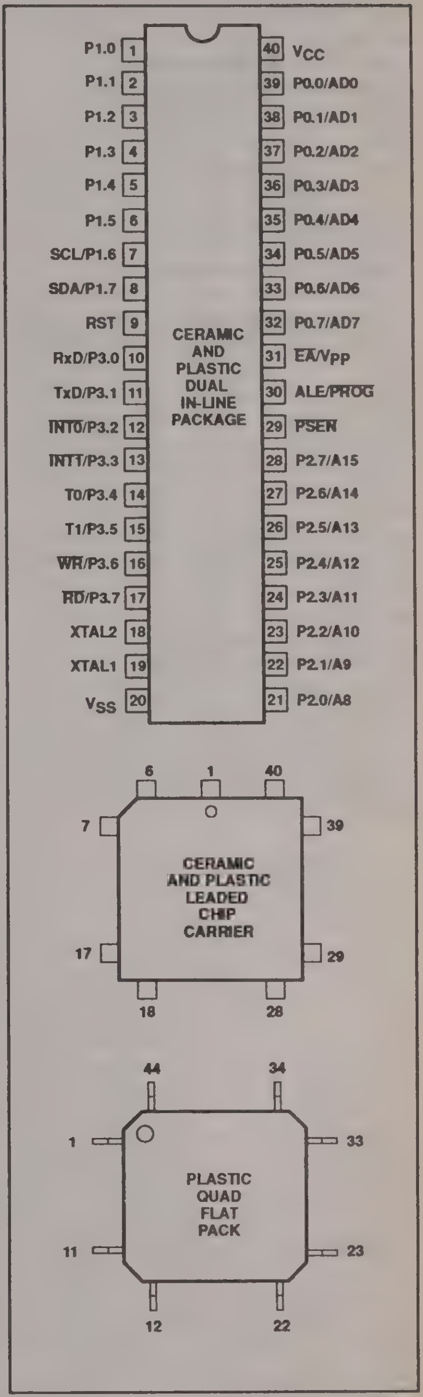
LOGIC SYMBOL


VCC VSS
RST
XTAL1
XTAL2
VPP/EA
PSEN
PROG/ALE
ALTERNATE FUNCTIONS
PORT 3
RxD
TxD
INT0
INT1
T0
T1
WR
RD
PORT 0
ADDRESS AND DATA BUS
PORT 1
SCL
SDA
PORT 2
ADDRESS BUS

FEATURES

- 80C51 central processing unit
- 8k × 8 EPROM expandable externally to 64k bytes (EPROM is not expandable)
- 256 × 8 RAM, expandable externally to 64k bytes
- Two standard 16-bit timer/counters
- Four 8-bit I/O ports
- I²C-bus serial I/O port with byte oriented master and slave functions
- Full-duplex UART facilities
- Power control modes
  - Idle mode
  - Power-down mode
- Five package styles
- Extended temperature range
- OTP package available
- Three speed ranges
  - 16MHz
  - 20MHz

PIN CONFIGURATION


P1.0 1
P1.1 2
P1.2 3
P1.3 4
P1.4 5
P1.5 6
SCL/P1.6 7
SDA/P1.7 8
RST 9
RxD/P3.0 10
TxD/P3.1 11
INT0/P3.2 12
INT1/P3.3 13
T0/P3.4 14
T1/P3.5 15
WR/P3.6 16
RD/P3.7 17
XTAL2 18
XTAL1 19
VSS 20
40 VCC
39 P0.0/AD0
38 P0.1/AD1
37 P0.2/AD2
36 P0.3/AD3
35 P0.4/AD4
34 P0.5/AD5
33 P0.6/AD6
32 P0.7/AD7
31 EA/VPP
30 ALE/PROG
29 PSEN
28 P2.7/A15
27 P2.6/A14
26 P2.5/A13
25 P2.4/A12
24 P2.3/A11
23 P2.2/A10
22 P2.1/A9
21 P2.0/A8
CERAMIC AND PLASTIC DUAL IN-LINE PACKAGE
6
1
40
7
39
CERAMIC AND PLASTIC LEADED CHIP CARRIER
17
29
18
28
44
34
1
33
PLASTIC QUAD FLAT PACK
11
23
12
22

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Philips Semiconductors

PHILIPS

87C654 – CMOS Single-Chip 8-Bit Microcontroller

DESCRIPTION

The 87C654 Single-Chip 8-Bit Microcontroller is manufactured in an advanced CMOS process and is a derivative of the 80C51 microcontroller family. The 87C654 has the same instruction set as the 80C51. Two versions of the derivative exist:

83C654—16k bytes mask programmable ROM

87C654—EPROM version

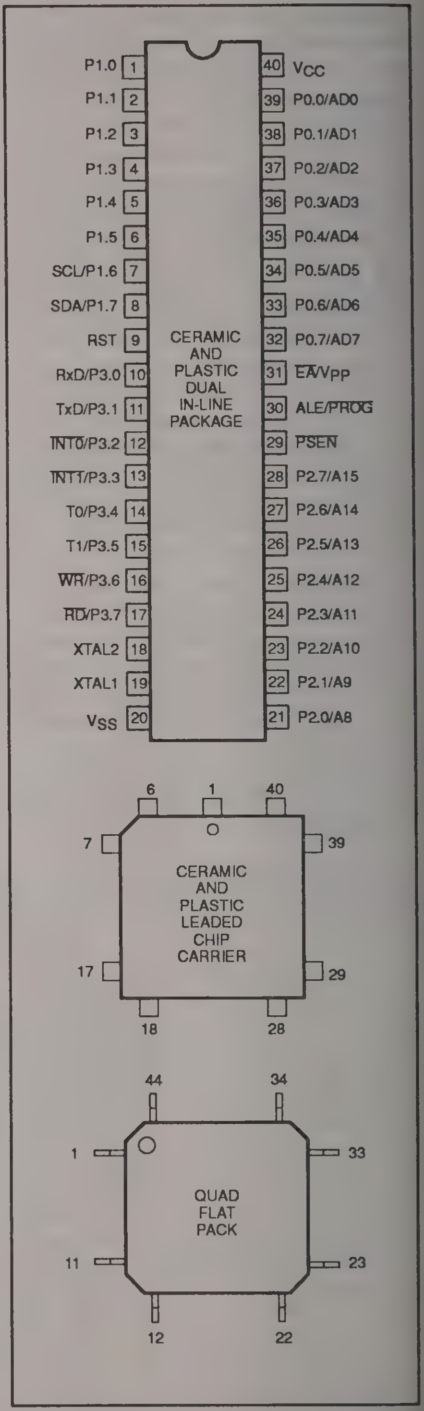
This device provides architectural enhancements that make it applicable in a variety of applications for general control systems. The 87C654 contains a non-volatile 16k × 8 EPROM, a volatile 256 × 8 read/write data memory, four 8-bit I/O ports, two 16-bit timer/event counters (identical to the timers of the 80C51), a multi-source, two-priority-level, nested interrupt structure, an I²C interface, UART and on-chip oscillator and timing circuits. For systems that require extra capability, the 87C654 can be expanded using standard TTL compatible memories and logic.

The device also functions as an arithmetic processor having facilities for both binary and BCD arithmetic plus bit-handling capabilities. The instruction set consists of over 100 instructions: 49 one-byte, 45 two-byte and 17 three-byte. With a 16MHz crystal, 58% of the instructions are executed in 0.75µs and 40% in 1.5µs. Multiply and divide instructions require 3µs.

FEATURES

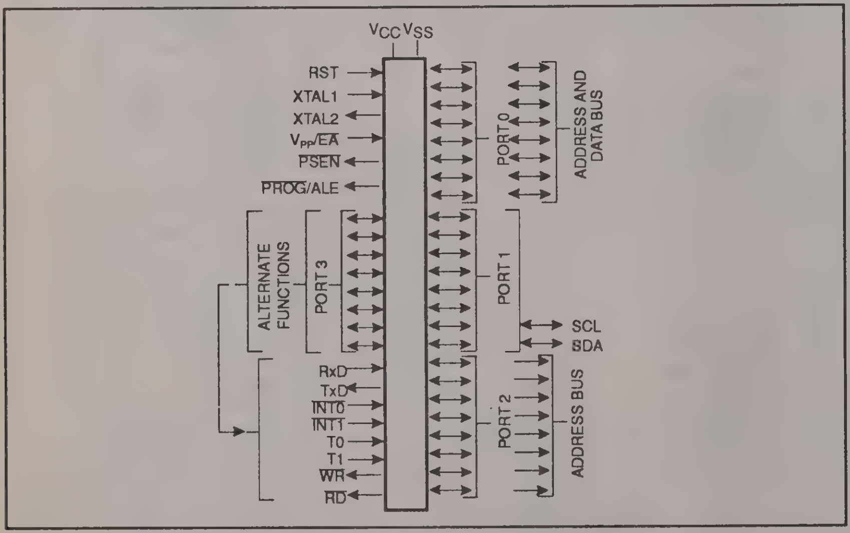
- 80C51 central processing unit
- 16k × 8 EPROM expandable externally to 64k bytes
- 256 × 8 RAM, expandable externally to 64k bytes
- Two standard 16-bit timer/counters
- Four 8-bit I/O ports
- I²C-bus serial I/O port with byte oriented master and slave functions
- Full-duplex UART facilities
- Power control modes
  - Idle mode
  - Power-down mode
- Five package styles
- Extended temperature range
- OTP package available
- Three speed ranges
  - 16MHz
  - 20MHz

PIN CONFIGURATIONS


P1.0 1
P1.1 2
P1.2 3
P1.3 4
P1.4 5
P1.5 6
SCL/P1.6 7
SDA/P1.7 8
RST 9
RxD/P3.0 10
TxD/P3.1 11
INT0/P3.2 12
INT1/P3.3 13
T0/P3.4 14
T1/P3.5 15
WR/P3.6 16
RD/P3.7 17
XTAL2 18
XTAL1 19
VSS 20
40 VCC
39 P0.0/AD0
38 P0.1/AD1
37 P0.2/AD2
36 P0.3/AD3
35 P0.4/AD4
34 P0.5/AD5
33 P0.6/AD6
32 P0.7/AD7
31 EA/VPP
30 ALE/PROG
29 PSEN
28 P2.7/A15
27 P2.6/A14
26 P2.5/A13
25 P2.4/A12
24 P2.3/A11
23 P2.2/A10
22 P2.1/A9
21 P2.0/A8
CERAMIC AND PLASTIC DUAL IN-LINE PACKAGE
6
1
40
7
39
17
29
18
28
CERAMIC AND PLASTIC LEADED CHIP CARRIER
44
34
1
33
11
23
12
22
QUAD FLAT PACK

01/07/93

LOGIC SYMBOL


VCC VSS
RST
XTAL1
XTAL2
VPP/EA
PSEN
PROG/ALE
PORT 0
ADDRESS AND DATA BUS
ALTERNATE FUNCTIONS
PORT 3
PORT 1
SCL
SDA
RxD
TxD
INT0
INT1
T0
T1
WR
RD
PORT 2
ADDRESS BUS

Philips Semiconductors

PHILIPS

87C750 – CMOS Single-Chip 8-Bit Microcontroller

DESCRIPTION

The Philips 87C750 offers the advantages of the 80C51 architecture in a small package and at low cost.

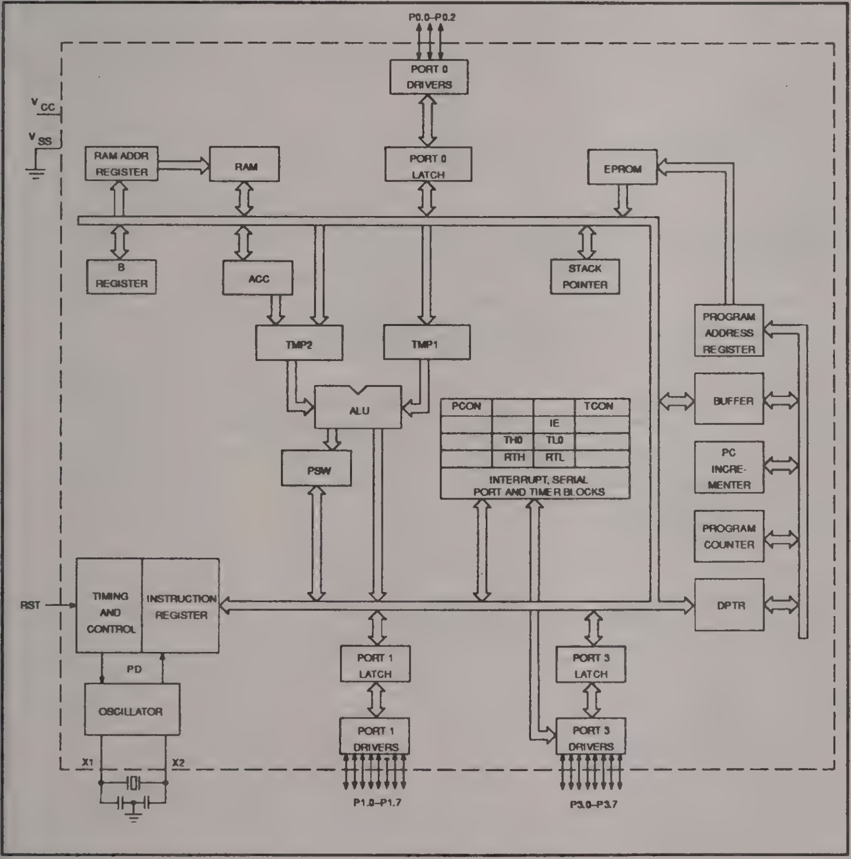
The 87C750 Microcontroller is fabricated with Philips high-density CMOS technology. Philips epitaxial substrate minimizes CMOS latch-up sensitivity.

The 87C750 contains a 1k × 8 EPROM, a 64 × 8 RAM, 19 I/O lines, a 16-bit auto-reload counter/timer, a five-source, fixed-priority level interrupt structure and an on-chip oscillator.

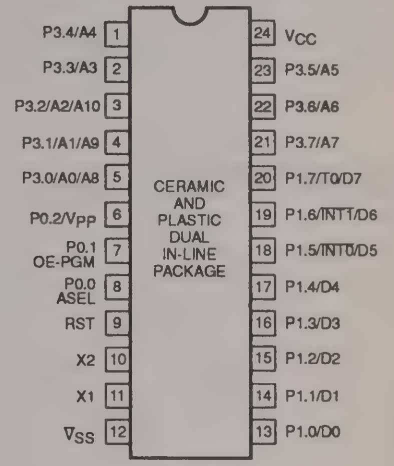
FEATURES

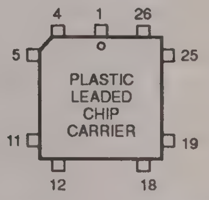
- 80C51 based architecture
- Wide oscillator frequency range—up to 40MHz
- Small package sizes
  - – 24-pin DIP (300 mil "skinny DIP")
  - – 28-pin PLCC
- 87C750 available in erasable quartz lid or one-time programmable plastic packages
- Low power consumption:
  - – Normal operation: less than 11mA @ 5V, 12MHz
  - – Idle mode
  - – Power-down mode
- 1k × 8 EPROM (87C750)
- 64 × 8 RAM
- 16-bit auto reloadable counter/timer
- Fixed-rate timer
- Boolean processor
- CMOS and TTL compatible
- Well suited for logic replacement, consumer and industrial applications
- LED drive outputs

BLOCK DIAGRAM


P0.0–P0.2
PORT 0 DRIVERS
VCC
VSS
RAM ADDR REGISTER
RAM
PORT 0 LATCH
EPROM
B REGISTER
ACC
STACK POINTER
TMP2
TMP1
PROGRAM ADDRESS REGISTER
ALU
PCON
TCON
IE
TH0
TL0
RTH
RTL
INTERRUPT, SERIAL PORT AND TIMER BLOCKS
BUFFER
PSW
PC INCRE-MENTER
PROGRAM COUNTER
RST
TIMING AND CONTROL
INSTRUCTION REGISTER
DPTR
PD
PORT 1 LATCH
PORT 3 LATCH
OSCILLATOR
PORT 1 DRIVERS
PORT 3 DRIVERS
X1
X2
P1.0–P1.7
P3.0–P3.7

PIN CONFIGURATIONS


P3.4/A4 1
P3.3/A3 2
P3.2/A2/A10 3
P3.1/A1/A9 4
P3.0/A0/A8 5
P0.2/VPP 6
P0.1 OE-PGM 7
P0.0 ASEL 8
RST 9
X2 10
X1 11
VSS 12
24 VCC
23 P3.5/A5
22 P3.6/A6
21 P3.7/A7
20 P1.7/T0/D7
19 P1.6/INT1/D6
18 P1.5/INT0/D5
17 P1.4/D4
16 P1.3/D3
15 P1.2/D2
14 P1.1/D1
13 P1.0/D0
CERAMIC AND PLASTIC DUAL IN-LINE PACKAGE


4
1
26
5
25
11
19
12
18
PLASTIC LEADED CHIP CARRIER

Pin	Function	Pin	Function
1	P3.4/A4	15	P1.0/D0
2	P3.3/A3	16	P1.1/D1
3	P3.2/A2/A10	17	P1.2/D2
4	P3.1/A1/A9	18	P1.3/D3
5	N.C.	19	P1.4/D4
6	P3.0/A0/A8	20	P1.5/$\overline{\text{INT0}}$/D5
7	P0.2/V_{PP}	21	N.C.
8	P0.1/S/OE-PGM	22	N.C.
9	P0.0/S/ASEL	23	P1.6/$\overline{\text{INT1}}$/D6
10	N.C.	24	P1.7/T0/D7
11	RST	25	P3.7/A7
12	X2	26	P3.6/A6
13	X1	27	P3.5/A5
14	V_{SS}	28	V_{CC}

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Philips Semiconductors

PHILIPS

NE/SA5224 and NE/SA5225 – Fiber Optic Postamplifiers

DESCRIPTION

The NE/SA5224 and NE/SA5225 are high-gain limiting amplifiers that are designed to process signals from fiber optic preamplifiers. Capable of operating at 125Mb/s, the 5224 chip is FDDI compatible and has input signal level-detection with a user-adjustable threshold. The DATA and LEVEL-DETECT outputs are differential for optimum noise margin and ease of use. The NE/SA5225 is an ECL 10K version of the NE/SA5224.

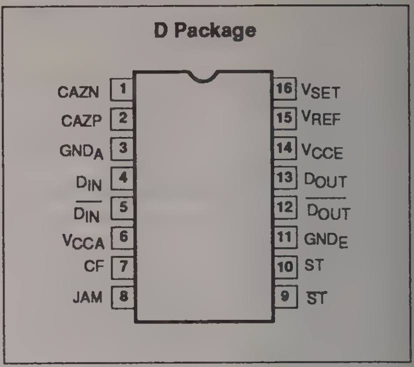
FEATURES

- Wideband operation: 1.0kHz to 120MHz typical
- Operation with single +5V or –5.2V supply
- Differential ECL outputs
  - – 5224 = 100k
  - – 5225 = 10k
- Programmable input signal level-detection
- Fully differential for excellent PSRR to 1GHz

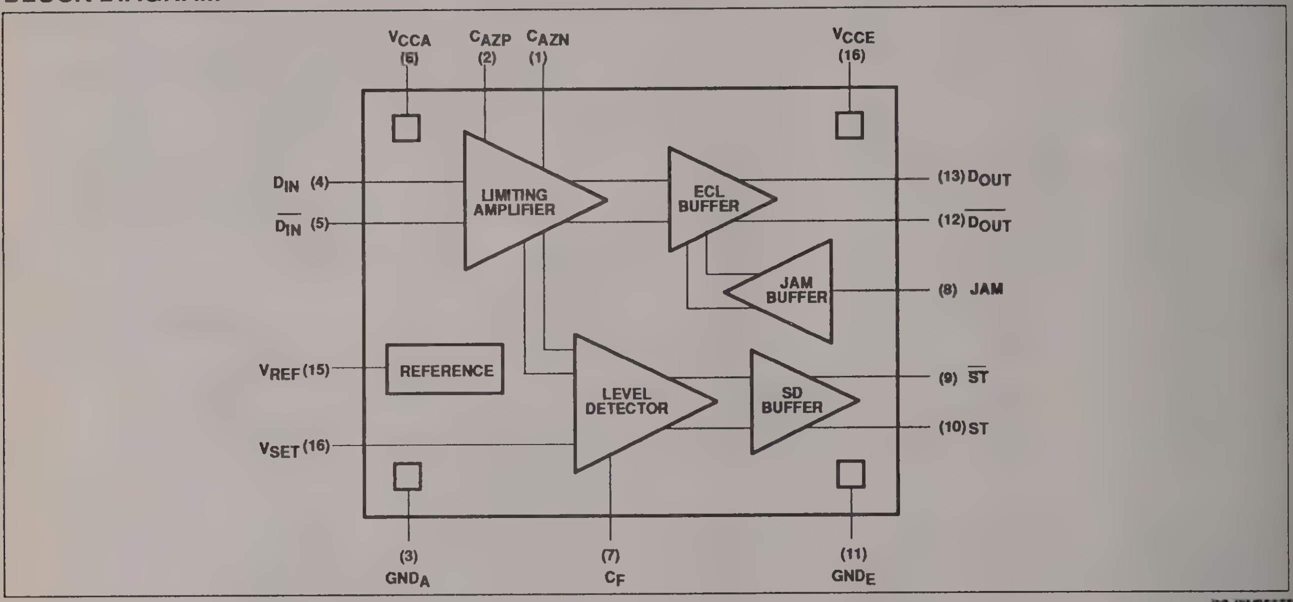
GENERAL APPLICATIONS

- Data communication in noisy industrial environments
- LANs

PIN DESCRIPTION


D Package
CAZN 1
CAZP 2
GND_A 3
D_{IN} 4
$\overline{D_{IN}}$ 5
V_{CCA} 6
CF 7
JAM 8
16 V_{SET}
15 V_{REF}
14 V_{CCE}
13 D_{OUT}
12 $\overline{D_{OUT}}$
11 GND_E
10 ST
9 $\overline{ST}$

BLOCK DIAGRAM


V_{CCA} (6)
C_{AZP} (2)
C_{AZN} (1)
V_{CCE} (16)
D_{IN} (4)
$\overline{D_{IN}}$ (5)
LIMITING AMPLIFIER
ECL BUFFER
JAM BUFFER
(13) D_{OUT}
(12) $\overline{D_{OUT}}$
(8) JAM
V_{REF} (15)
REFERENCE
LEVEL DETECTOR
SD BUFFER
(9) $\overline{ST}$
(10) ST
V_{SET} (16)
(3) GND_A
(7) C_F
(11) GND_E

Philips Semiconductors

PHILIPS

NE8392A – Coaxial Transceiver Interface for Ethernet/Thin Ethernet

DESCRIPTION

The NE8392A Coaxial Transceiver Interface (CTI) is a coaxial line driver/receiver for Ethernet (10base5) and Thin Ethernet (10base2) local area networks. The CTI is connected between the coaxial cable and the Data Terminal Equipment (DTE) and consists of a receiver, transmitter, collision detector, heartbeat generator and jabber timer (see Block Diagram). The transmitter output connects directly to a doubly terminated 50Ω cable, while the receiver output, collision detector output and transmitter input are connected to the DTE through isolation transformers. Isolation between the CTI and the DTE is an IEEE 802.3 requirement that can be met on signal lines by using a set of pulse transformers normally available in a standard 16-pin DIP. Power isolation for the CTI is achieved using DC-to-DC conversion through a power transformer.

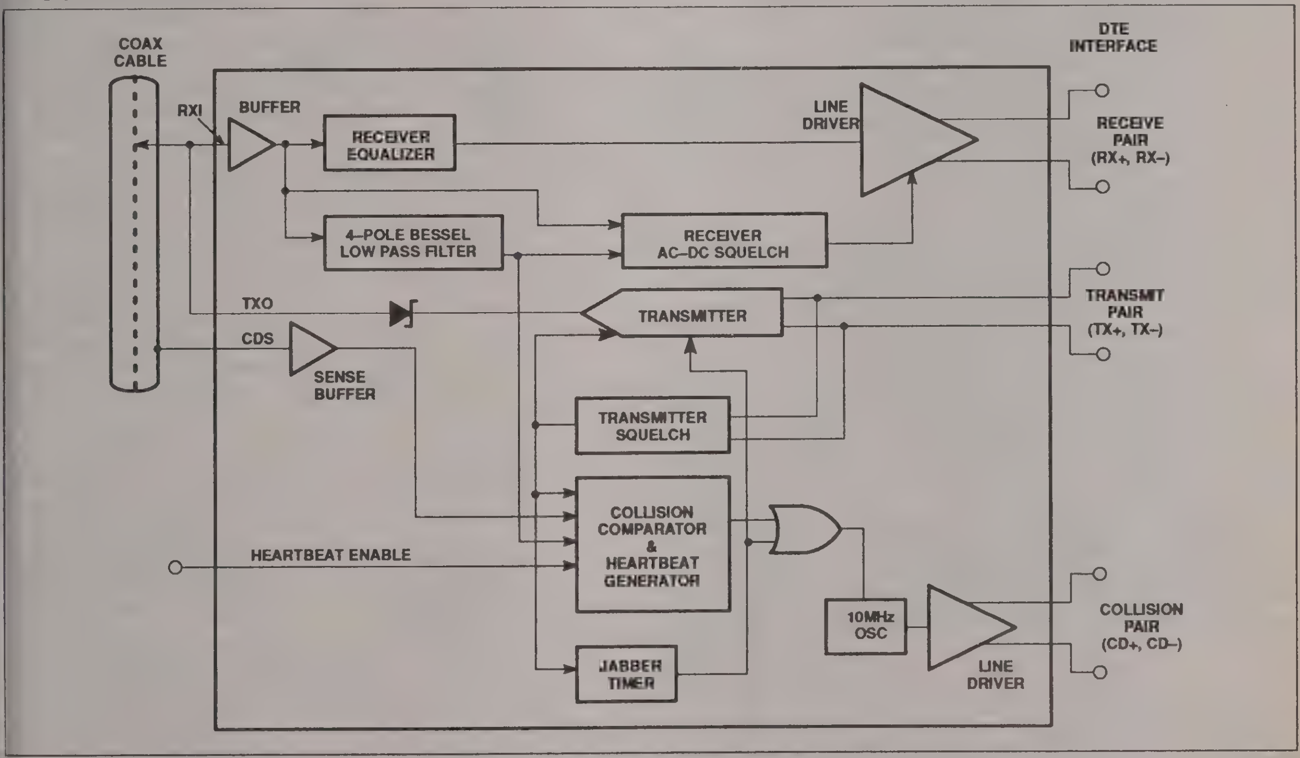
During transmission the jabber timer is initiated to disable the CTI transmitter in the event of a longer than legal length data packet. Collision detection circuitry monitors the signals on the coaxial cable to determine the presence of colliding packets and signals the DTE in the event of a collision. At the end of every transmission the heartbeat generator creates a pseudo collision for a short time to ensure that the collision circuitry is functioning correctly. The heartbeat function can be disabled for repeater applications.

The CTI is normally part of a three chip set that implements a complete Ethernet/ Thin Ethernet network interface for a DTE (see Figure 2, Interface Diagram). The other chips are a Serial Network Interface (SNI) and a Network Interface Controller (NIC). The SNI provides Manchester Encoding and Decoding while the NIC handles the media access protocol and buffer management tasks.

FEATURES

- Compatible with Ethernet II, IEEE 802.3 10base5 and 10base2, and ISO 8802/3 interface specifications
- Integrates all transceiver electronics except signal and power isolation
- Only one external resistor required for setting coaxial signaling current
- Jabber timer function integrated on chip
- Heartbeat generator can be externally disabled for operation as IEEE 802.3 compatible repeaters
- On-chip precision voltage reference for receive mode collision detection
- Squelch circuitry on all signal inputs rejects noise
- Full ESD protection
- Standard 16-pin DIP with special lead frame minimizes the operating die temperature
- Power-on reset prevents glitches on coaxial cable during power up.

BLOCK DIAGRAM


COAX CABLE
RXI
BUFFER
RECEIVER EQUALIZER
LINE DRIVER
DTE INTERFACE
RECEIVE PAIR (RX+, RX–)
4–POLE BESSEL LOW PASS FILTER
RECEIVER AC–DC SQUELCH
TXO
TRANSMITTER
TRANSMIT PAIR (TX+, TX–)
CDS
SENSE BUFFER
TRANSMITTER SQUELCH
COLLISION COMPARATOR & HEARTBEAT GENERATOR
HEARTBEAT ENABLE
10MHz OSC
LINE DRIVER
COLLISION PAIR (CD+, CD–)
JABBER TIMER

10/09/90

PHILIPS

NE86C92 – Twisted-Pair Transceiver Interface

DESCRIPTION

The NE86C92 is a twisted-pair transceiver that implements the IEEE 802.3 10BASE-T Ethernet specification. The circuit provides the connection between the Manchester encoder/decoder and the twisted-pair cable and includes a receiver, transmitter, collision detector, heartbeat generator, jabber timer, link integrity monitor, and control circuits and drivers for five LED status indicators.

The NE86C92 includes receive polarity detection with automatic polarity correction, smart squelch on all signal inputs for improved noise immunity, and a highly reliable crystal oscillator to set pre-distortion timing and the collision signal frequency.

The NE86C92 also allows for automatic selection between AUI and twisted-pair (RJ-45) connections; thus eliminating the need for end-users to remove the interface board and move jumpers to switch between connections. An application note is available which describes implementation of this feature.

The twisted-pair outputs and inputs connect to the twisted-pair cable through transmit and receive filters while the receiver output, collision detector output and transmitter input are connected to the Manchester encoder/decoder through pulse transformers. This interface to the encoder/decoder is, therefore, directly compatible with current 10Base2/10Base5 connections and allows easy expansion of existing interface cards for twisted-pair wiring.

During transmission the jabber timer is initiated to disable the NE86C92 in the event of a longer than legal length data packet. Collision detection circuitry monitors both the transmit path and the receiver input to determine the presence of colliding packets and signals the Manchester encoder/decoder in the event of a collision. At the end of every transmission the heartbeat generator creates a pseudo collision for a short time to ensure that the collision circuity is functioning correctly. The link integrity monitor emits pulses onto the twisted-pair cable and expects to receive pulses from the twisted-pair cable at regular intervals. If no pulses or packets are received, a link failure has occurred; this is indicated by the RLED status indicator. Both heartbeat and link integrity monitor functions can be disabled.

The NE86C92 is normally part of a three chip set for implementing a complete twisted-pair Ethernet network interface. The other chips are the Manchester encoder/decoder, such as the NE502A, and a Network Interface Controller, such as the NE86950.

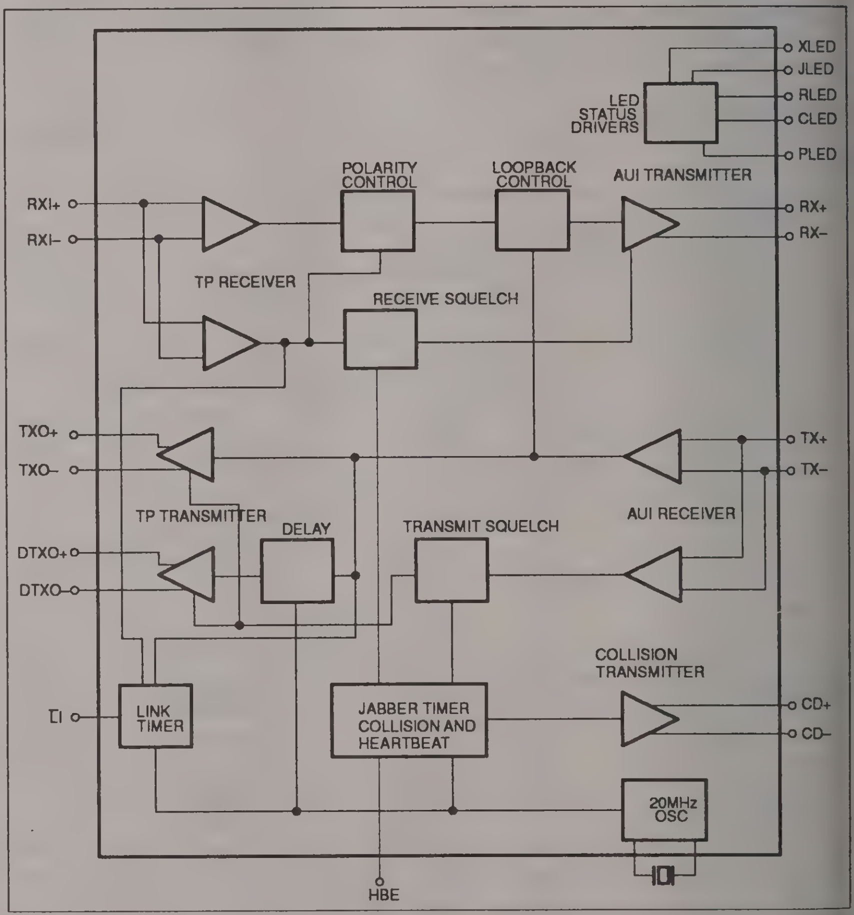
FEATURES

- Compatible with IEEE 802.3 10BASE-T specifications
- Integrates all transceiver functions, with selectable heartbeat and link test generators
- Twisted-pair polarity detection and automatic correction
- Smart squelch on all data inputs
- Internal transmitter pre-distortion generator
- Supports automatic selection between AUI and RJ-45 connections
- Five LED status signals with on-chip drivers for transmit, receive and link integrity, collision, jabber status and twisted pair polarity reversal
- Advanced CMOS process uses single 5V supply
- Extremely low power operation: 24mA typical idle current

APPLICATIONS

- 10BASE-T network interfaces for computers and workstations
- External 10BASE-T transceiver units

BLOCK DIAGRAM



07/29/91

Philips Semiconductors

PHILIPS

SC26C92 – Dual Universal Asynchronous Receiver/Transmitter (DUART)
SC26C/68C94 – Quad Universal Asynchronous Receiver/Transmitter (QUART)

DESCRIPTION

The SC26C92 is a pin and function replacement for the SCC2692 with added features and deeper FIFOs. Its configuration on power up is that of the 2692. Its differences from the 2692 are: 8 character receiver, 8 character transmit FIFOs, receiver watch dog timer, mode register 0 is added, extended baud rate and overall faster speeds, programmable receiver and transmitter interrupts. (The SCC2692 is not being discontinued.)

The Philips Semiconductors SC26C92 Dual Universal Asynchronous Receiver/Transmitter (DUART) is a single-chip CMOS-LSI communications device that provides two full-duplex asynchronous receiver/transmitter channels in a single package. It interfaces directly with microprocessors and may be used in a polled or interrupt driven system.

The operating mode and data format of each channel can be programmed independently. Additionally, each receiver and transmitter can select its operating speed as one of eighteen fixed baud rates, a 16X clock derived from a programmable counter/timer, or an external 1X or 16X clock. The baud rate generator and counter/timer can operate directly from a crystal or from external clock inputs. The ability to independently program the operating speed of the receiver and transmitter make the DUART particularly attractive for dual-speed channel applications such as clustered terminal systems.

Each receiver and transmitter is buffered by eight character FIFOs to minimize the potential of receiver overrun, transmitter underrun and to reduce interrupt overhead in interrupt driven systems. In addition, a flow control capability is provided to disable a remote transmitter when the receiver buffer is full.

Also provided on the SC26C92 are a multipurpose 7-bit input port and a multipurpose 8-bit output port. These can be used as general purpose I/O ports or can be assigned specific functions (such as clock inputs or status/interrupt outputs) under program control.

The SC26C92 is available in two package versions: 40-pin 0.6" wide DIP and a 44-pin PLCC.

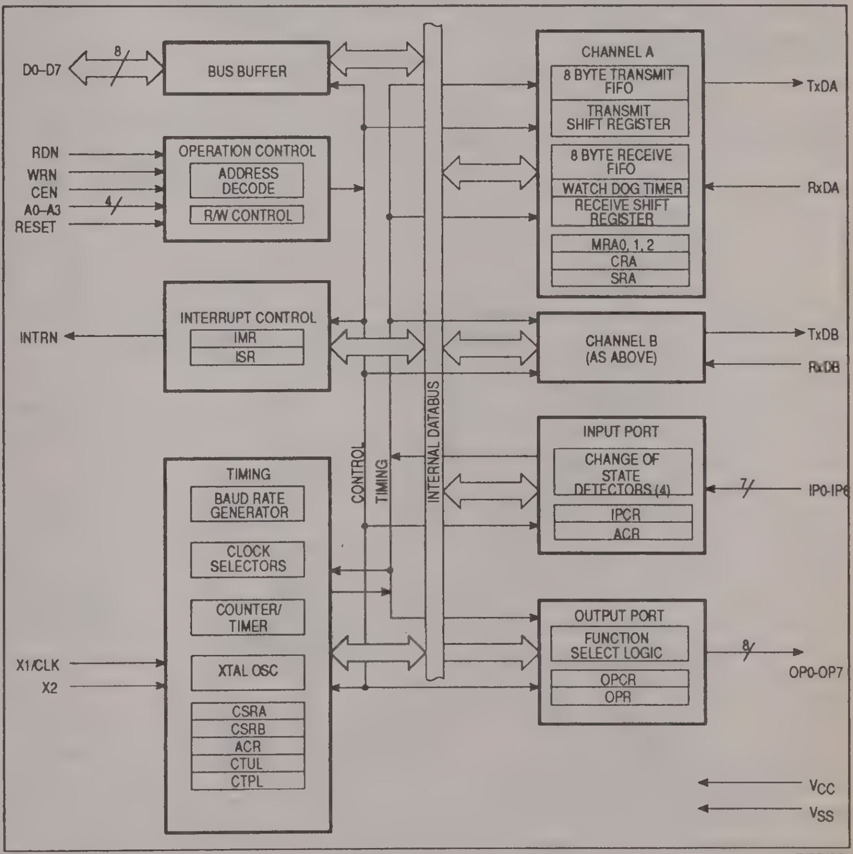
BASIC FEATURES

- Dual full-duplex independent asynchronous Rx/Tx
- 8 character FIFOs for each Receiver and Transmitter
- Programmable data format and baud rate
- Parity, framing and overrun error detection
- Multidrop address detection
- On-chip crystal oscillator
- Power down mode
- Receiver timeout mode
- Single +5V supply

ADDITIONAL FEATURES OF QUARTs

- 16MHz clock rate for 1MHz datarate
- 8-fold increase in interrupt efficiency due to new arbitration system
- Expanded internal baud rate select to 500KHz
- Watchdog timer for each receiver
- Designed for both Intel and Motorola interfaces

BLOCK DIAGRAM – SC26C92


D0–D7
8
BUS BUFFER
RDN
WRN
CEN
A0–A3
4
RESET
OPERATION CONTROL
ADDRESS DECODE
R/W CONTROL
INTRN
INTERRUPT CONTROL
IMR
ISR
TIMING
BAUD RATE GENERATOR
CLOCK SELECTORS
COUNTER/ TIMER
XTAL OSC
CSRA
CSRB
ACR
CTUL
CTPL
X1/CLK
X2
CONTROL
TIMING
INTERNAL DATABUS
CHANNEL A
8 BYTE TRANSMIT FIFO
TRANSMIT SHIFT REGISTER
8 BYTE RECEIVE FIFO
WATCH DOG TIMER
RECEIVE SHIFT REGISTER
MRA0, 1, 2
CRA
SRA
TxDA
RxDA
CHANNEL B (AS ABOVE)
TxDB
RxDB
INPUT PORT
CHANGE OF STATE DETECTORS (4)
IPCR
ACR
7
IP0-IP6
OUTPUT PORT
FUNCTION SELECT LOGIC
OPCR
OPR
8
OP0-OP7
VCC
VSS

7/29/92

NOTE: SC26/68C94 has 2 more independent Rx/Tx channels.

Philips Semiconductors

PHILIPS

SC26C460/SC68C460 – Input/output Processor (IOP)

DESCRIPTION

The Philips Semiconductors SC26C460 I/O Processor (IOP) is a co-processor that greatly reduces the CPU overhead required to service a large number of I/O devices. It can inspect, modify or delete the data it transfers. Each channel can have its own channel program, which can branch depending on device status or a data test.

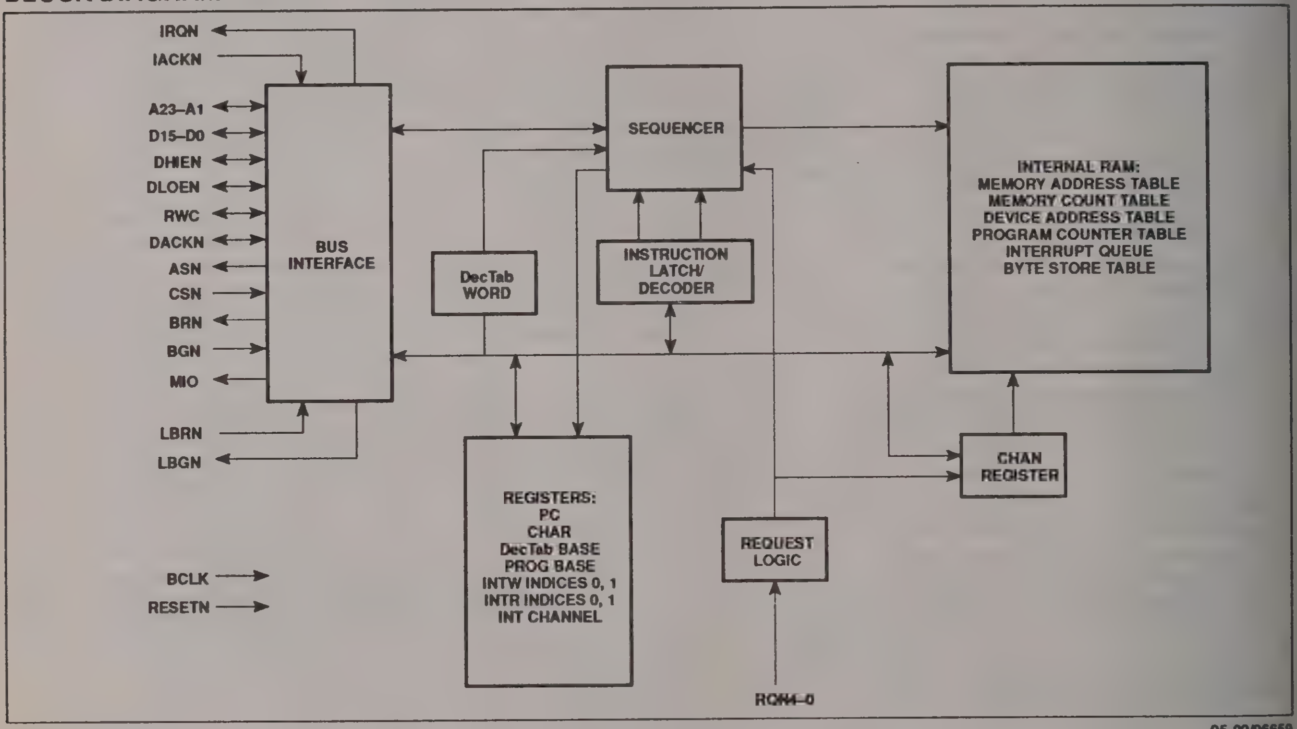
The IOP includes the features of a 32-channel Direct Memory Access (DMA) controller. This helps in handling multi-channel devices such as the Philips Semiconductors 2698 OCT-ART. It can create a data buffer chain in memory to transfer sequential blocks, greatly reducing the number of times the CPU needs to be interrupted.

The IOP can be attached directly to the system bus, or for higher performance, can support an additional local I/O bus.

FEATURES

- 32 channel DMA processor
- Separate memory address and length for each channel
- Separate I/O device address for each channel
- Separate channel program entry point for each channel
- Programmable to handle virtually all types of peripherals
- Custom instruction set
- Can interpret peripheral status for channel selection, error checking
- Can interpret data characters for buffer termination checking, control sequence transformation
- 8- or 16-bit data transfers
- 24-bit memory addresses: 16Mbyte address space
- 2-level interrupt queue minimizes host microprocessor overhead
- Stores and fetches data similar to Intel processors
- Can transfer multiple blocks without interrupting the CPU
- High-speed CMOS technology
- 68-pin PLCC

BLOCK DIAGRAM


IRQN
IACKN
A23–A1
D15–D0
DHIEN
DLOEN
RWC
DACKN
ASN
CSN
BRN
BGN
MIO
LBRN
LBGN
BCLK
RESETN
BUS INTERFACE
SEQUENCER
DecTab WORD
INSTRUCTION LATCH/ DECODER
INTERNAL RAM: MEMORY ADDRESS TABLE MEMORY COUNT TABLE DEVICE ADDRESS TABLE PROGRAM COUNTER TABLE INTERRUPT QUEUE BYTE STORE TABLE
REGISTERS: PC CHAR DecTab BASE PROG BASE INTW INDICES 0, 1 INTR INDICES 0, 1 INT CHANNEL
REQUEST LOGIC
CHAN REGISTER
RQN4–0

05-92/06659

Philips Semiconductors

PHILIPS

SCC2698B – Enhanced Octal Universal Asynchronous Receiver/Transmitter (Octal UART)

DESCRIPTION

The SCC2698B Enhanced Octal Universal Asynchronous Receiver/Transmitter (Octal UART) is a single chip MOS-LSI communications device that provides eight full-duplex asynchronous receiver/transmitter channels in a single package. It is fabricated with CMOS technology which combines the benefits of high density and low power consumption.

The operating speed of each receiver and transmitter can be selected independently as one of eighteen fixed baud rates, a 16X clock derived from a programmable counter/timer, or an external 1X or 16X clock. The baud rate generator and counter/timer can operate directly from a crystal or from external clock inputs. The ability to independently program the operating speed of the receiver and transmitter make the Octal UART particularly attractive for dual-speed channel applications such as clustered terminal systems.

The receiver is quadruple buffered to minimize the potential of receiver overrun or to reduce interrupt overhead in interrupt driven systems. In addition, a handshaking capability is provided to disable a remote UART transmitter when the receiver buffer is full.

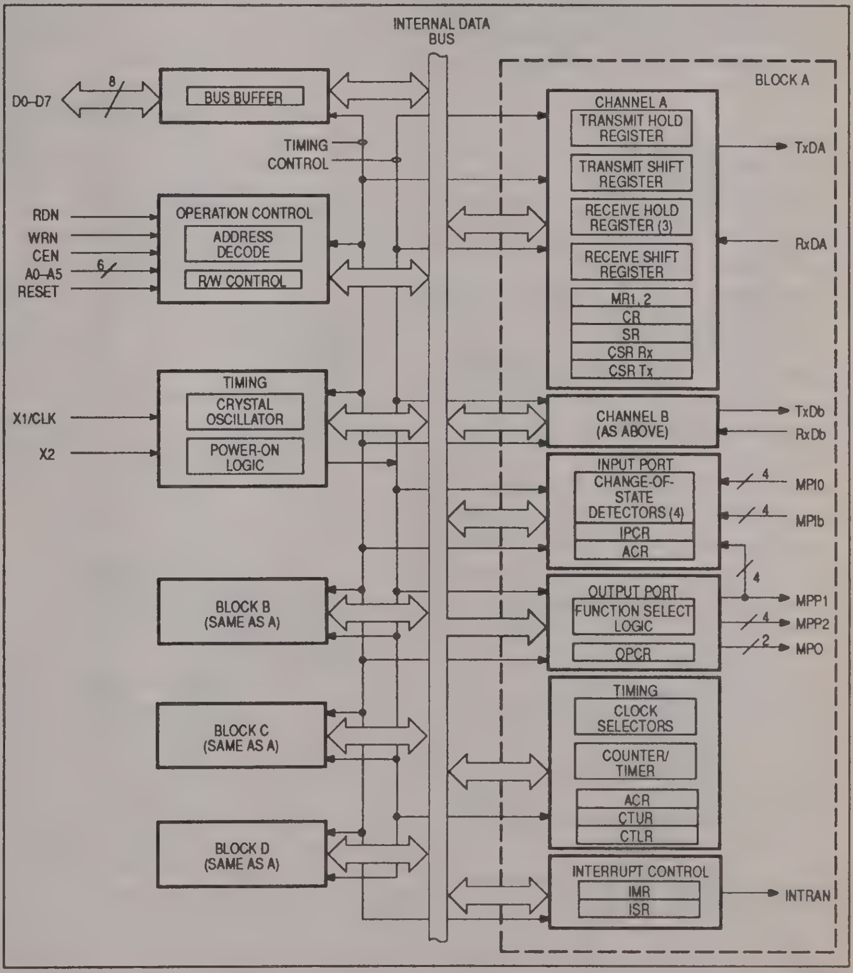
The UART provides a power-down mode in which the oscillator is frozen but the register contents are stored. This results in reduced power consumption on the order of several magnitudes. The Octal UART is fully TTL compatible and operates from a single +5V power supply.

The SCC2698B is an upwardly compatible version of the 2698A Octal UART. In PLCC packaging, it is enhanced by the addition of receiver ready or FIFO full status outputs, and transmitter empty status outputs for each channel on 16 multipurpose I/O pins. The multipurpose I/O pins of the SCC2698B were inputs only on the SCC2698A.

FEATURES

- Eight full-duplex asynchronous receiver/transmitters
- Quadruple buffered receiver data register
- Programmable data format:
  - 5 to 8 data bits plus parity
  - Odd, even, no parity or force parity
  - 1, 1.5 or 2 stop bits programmable in 1/16-bit increments
- Baud rate for the receiver and transmitter selectable from:
  - 18 fixed rates: 50 to 38.4K baud Non-standard rates to 115.2K baud
  - User-defined rates from the programmable counter/timer associated with each of four blocks
  - External 1x or 16x clock
- Parity, framing, and overrun error detection
- False start bit detection
- Line break detection and generation
- Programmable channel mode
  - Normal (full-duplex), automatic echo, local loop back, remote loopback
- Four multi-function programmable 16-bit counter/timers
- Four interrupt outputs with eight maskable interrupting conditions for each output
- Receiver ready/FIFO full and transmitter ready status available on 16 multi-function pins in PLCC package
- On-chip crystal oscillator
- TTL compatible
- Single +5V power supply with low power mode

BLOCK DIAGRAM


INTERNAL DATA BUS
D0–D7
8
BUS BUFFER
TIMING
CONTROL
RDN
WRN
CEN
A0–A5
6
RESET
OPERATION CONTROL
ADDRESS DECODE
R/W CONTROL
X1/CLK
X2
TIMING
CRYSTAL OSCILLATOR
POWER-ON LOGIC
BLOCK B (SAME AS A)
BLOCK C (SAME AS A)
BLOCK D (SAME AS A)
BLOCK A
CHANNEL A
TRANSMIT HOLD REGISTER
TRANSMIT SHIFT REGISTER
RECEIVE HOLD REGISTER (3)
RECEIVE SHIFT REGISTER
MR1, 2
CR
SR
CSR Rx
CSR Tx
TxDA
RxDA
CHANNEL B (AS ABOVE)
TxDb
RxDb
INPUT PORT
CHANGE-OF-STATE DETECTORS (4)
IPCR
ACR
4
MPI0
4
MPIb
4
OUTPUT PORT
FUNCTION SELECT LOGIC
OPCR
MPP1
4
MPP2
2
MPO
TIMING
CLOCK SELECTORS
COUNTER/TIMER
ACR
CTUR
CTLR
INTERRUPT CONTROL
IMR
ISR
INTRAN

07/29/92

Philips Semiconductors

PHILIPS

SC26C562/68C562 – CMOS Dual Universal Serial Communications Controller (CDUSCC)
SCN26/68562 – NMOS Dual Universal Serial Communications Controller (NDUSCC)

DESCRIPTION

The Philips Semiconductors SC26C562 Dual Universal Serial Communications Controller (CDUSCC) is a single-chip CMOS-LSI communications device that provides two independent, multi-protocol, full-duplex receiver/transmitter channels in a single package. It supports bit-oriented and character-oriented (byte count and byte control) synchronous data link controls as well as asynchronous protocols. The SC26C562 interfaces to synchronous bus MPUs and is capable of program-polled, interrupt driven, block-move or DMA data transfers.

The SC26C562 (CDUSCC) is (PIN) hardware and (REGISTER) software comaptible with the existing SCN26562 (DUSCC). CDUSCC will automatically configure to the NMOS DUSCC register map (default mode) on power up.

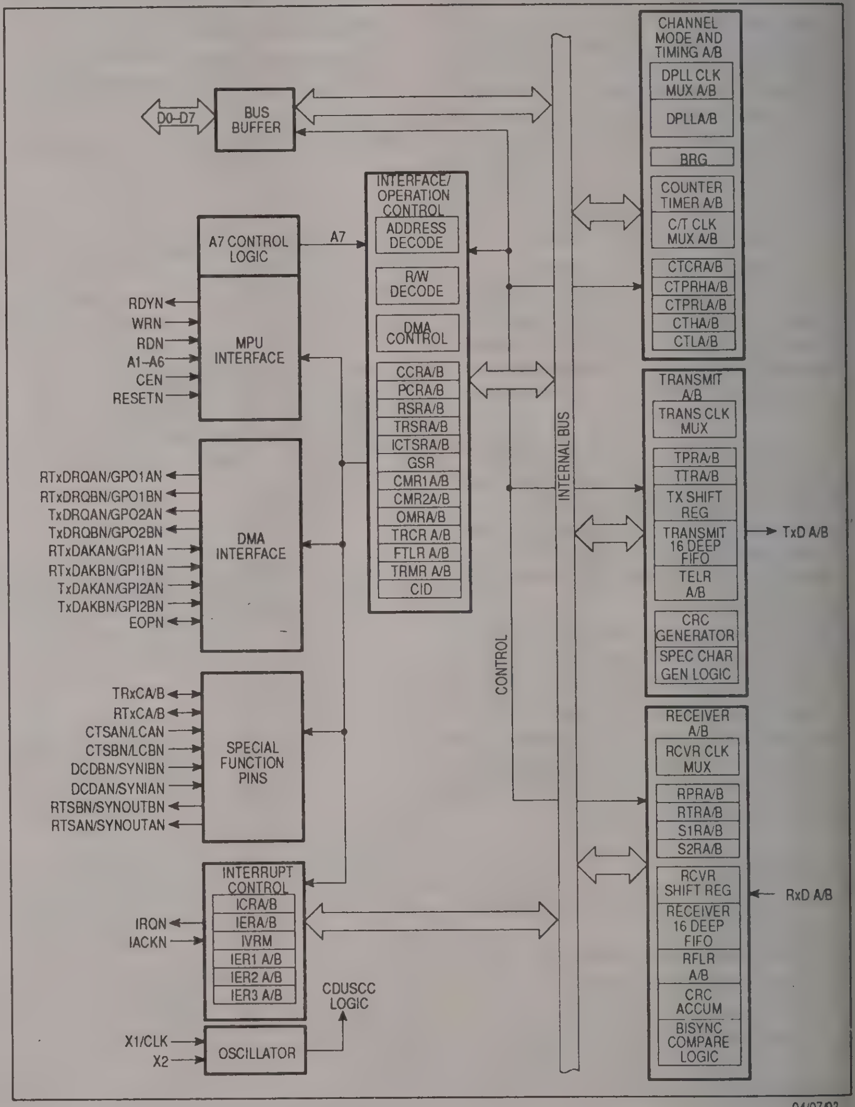
HIGH PERFORMANCE FEATURES

- Dual full duplex receiver
- Multi-protocol operations
  - Async
  - COP (BiSync, DDCMP, etc.)
  - BOP (HDLC, SDLC, X.21, X.25, Frame Relay, etc.) (with additional software drivers)
- High performance with up to 10Mb/s serial data rate
- Tx and Rx FIFOs: 4 characters for NDUSCC and 16 characters for CDUSCC
- Parity and FCS generation and checking
- Host interface: Polled I/O, interrupt I/O, DMA transfer, wait on ready bus cycle
- Tx and Rx clock selection: Internal counter/timer, internal fixed BRG, clock recovery through digital PLL
- DLE and SYN stripping in BiSync transparent mode
- Vectored and modified vector interrupt acknowledge
- Masking of up to 19 status bits for interrupts
- Interrupt priority selection by channel, function and interleaved
- DMA interface signals (DMAREQ, DMACK, DONE, etc.)
- Modem control and interface signals (RTS, CTS, etc.)
- User programmable multipurpose I/O signals
- Frame status byte through DMA (CDUSCC only)

APPLICATIONS

- Network terminals
- Network interface cards
- Workstations
- Network bridges
- Hubs and Smart Hubs
- Routers
- Gateways

BLOCK DIAGRAM — SC26C562


D0–D7
BUS BUFFER
A7 CONTROL LOGIC
A7
RDYN
WRN
RDN
A1–A6
CEN
RESETN
MPU INTERFACE
RTxDRQAN/GPO1AN
RTxDRQBN/GPO1BN
TxDRQAN/GPO2AN
TxDRQBN/GPO2BN
RTxDAKAN/GPI1AN
RTxDAKBN/GPI1BN
TxDAKAN/GPI2AN
TxDAKBN/GPI2BN
EOPN
DMA INTERFACE
TRxCA/B
RTxCA/B
CTSAN/LCAN
CTSBN/LCBN
DCDBN/SYNIBN
DCDAN/SYNIAN
RTSBN/SYNOUTBN
RTSAN/SYNOUTAN
SPECIAL FUNCTION PINS
INTERRUPT CONTROL
ICRA/B
IERA/B
IVRM
IER1 A/B
IER2 A/B
IER3 A/B
IRQN
IACKN
X1/CLK
X2
OSCILLATOR
CDUSCC LOGIC
INTERFACE/ OPERATION CONTROL
ADDRESS DECODE
R/W DECODE
DMA CONTROL
CCRA/B
PCRA/B
RSRA/B
TRSRA/B
ICTSRA/B
GSR
CMR1A/B
CMR2A/B
OMRA/B
TRCR A/B
FTLR A/B
TRMR A/B
CID
CONTROL
INTERNAL BUS
CHANNEL MODE AND TIMING A/B
DPLL CLK MUX A/B
DPLLA/B
BRG
COUNTER TIMER A/B
C/T CLK MUX A/B
CTCRA/B
CTPRHA/B
CTPRLA/B
CTHA/B
CTLA/B
TRANSMIT A/B
TRANS CLK MUX
TPRA/B
TTRA/B
TX SHIFT REG
TRANSMIT 16 DEEP FIFO
TELR A/B
CRC GENERATOR
SPEC CHAR GEN LOGIC
TxD A/B
RECEIVER A/B
RCVR CLK MUX
RPRA/B
RTRA/B
S1RA/B
S2RA/B
RCVR SHIFT REG
RECEIVER 16 DEEP FIFO
RFLR A/B
CRC ACCUM
BISYNC COMPARE LOGIC
RxD A/B

04/07/93

Philips Semiconductors

PHILIPS

Cellular Radio Chip Set

UMA1000/1014, NE605 or 606 family, NE5750/5751, PCF8282/8XC552

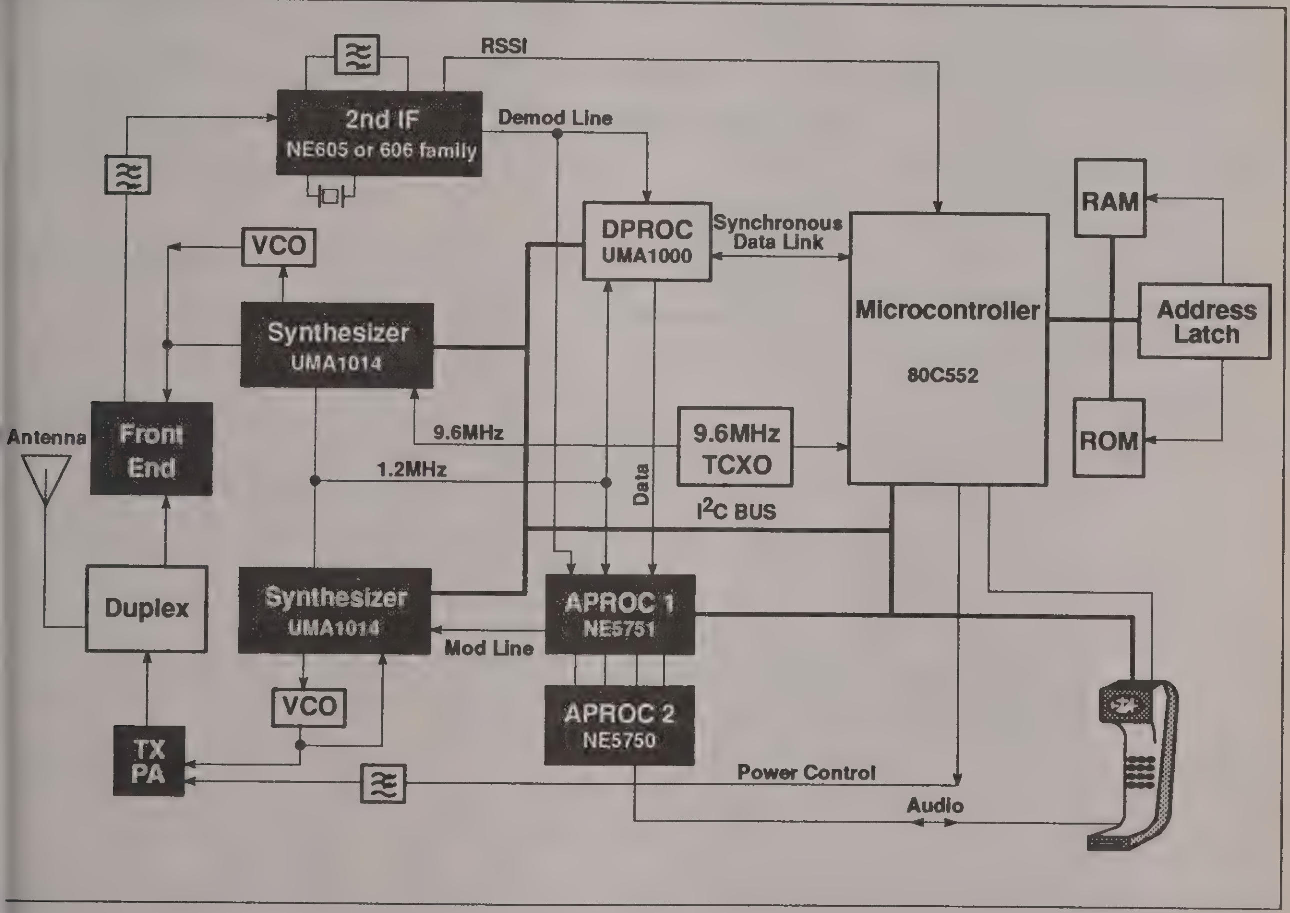
COMPONENTS

- NE605 or 606 Family – Low Power Single Chip FM Systems
- NE5750 – Audio Processor - Companding and Amplifier
- NE5751 – Audio Processor - Filter and Control Section
- UMA1000 – Data Processor for Cellular Radio
- UMA1014 – Low-Power Universal Synthesizer for Radio Communication
- S80C552 – Single Chip 8-Bit Microcontroller with A/D, Capture/Compare Timer, with High-Speed Outputs, PWM

FEATURES

- 6 key ICs for maximum integration
- Integrated filters, amplifiers, and compandors to reduce off-chip components
- Designed for minimum current consumption, i.e., maximum use of standby modes, low current IC design
- I^{2}C serial control bus

CELLULAR RADIO CHIP SET SCHEMATIC


RSSI
2nd IF
NE605 or 606 family
Demod Line
DPROC
UMA1000
Synchronous Data Link
Microcontroller
80C552
RAM
Address Latch
ROM
VCO
Synthesizer
UMA1014
Antenna
Front End
9.6MHz
1.2MHz
9.6MHz TCXO
Data
I²C BUS
Duplex
Synthesizer
UMA1014
Mod Line
APROC 1
NE5751
APROC 2
NE5750
VCO
TX PA
Power Control
Audio

Philips Semiconductors

PHILIPS

NE/SA568A – 150MHz Phase-Locked Loop

DESCRIPTION

The NE568A is a monolithic phase-locked loop (PLL) which operates from 1Hz to frequencies in excess of 150MHz and features an extended supply voltage range and a lower temperature coefficient of the V_{CO} center frequency in comparison with its predecessor, the NE 568. The NE568A is function and pin-compatible with the NE568, requiring only minor changes in peripheral circuitry. Temperature compensation network is different, no resistor on Pin 12, needs to be grounded and Pin 13 has a 3.9kΩ resistor to ground. Timing cap, C_2, is different and for 70MHz operation with temperature compensation network should be 16pF, not 34pF as was used in the NE568. The NE568A has the following improvements: ESD protected; extended V_{CC} range from 4.5V to 5.5V; operating temperature range -55 to 125°C (see Philips Semiconductors Military 568A data sheet); less layout sensitivity; and lower T_C of VCO (center frequency). The integrated circuit consists of a limiting amplifier, a current-controlled oscillator (ICO), a phase detector, a level shift circuit, V/I and I/V converters, an output buffer, and bias circuitry with temperature and frequency compensating characteristics. The design of the NE568A is particularly well-suited for demodulation of FM signals with extremely large deviation in systems which require a highly linear output. In satellite receiver applications with a 70MHz IF, the NE568A will demodulate ±20% deviations with less than 1.0% typical non-linearity. In addition to high linearity, the circuit has a loop filter which can be configured with series or shunt elements to optimize loop dynamic performance. The NE568A is available in 20-pin dual in-line and 20-pin SO (surface mounted) plastic packages.

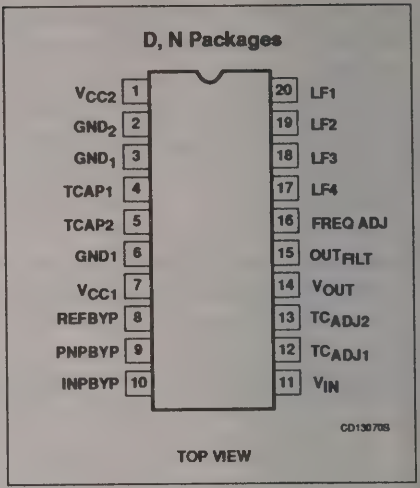
FEATURES

- Operation to 150MHz
- High linearity buffered output
- Series or shunt loop filter component capability
- External loop gain control
- Temperature compensated
- ESD protected[1]

APPLICATIONS

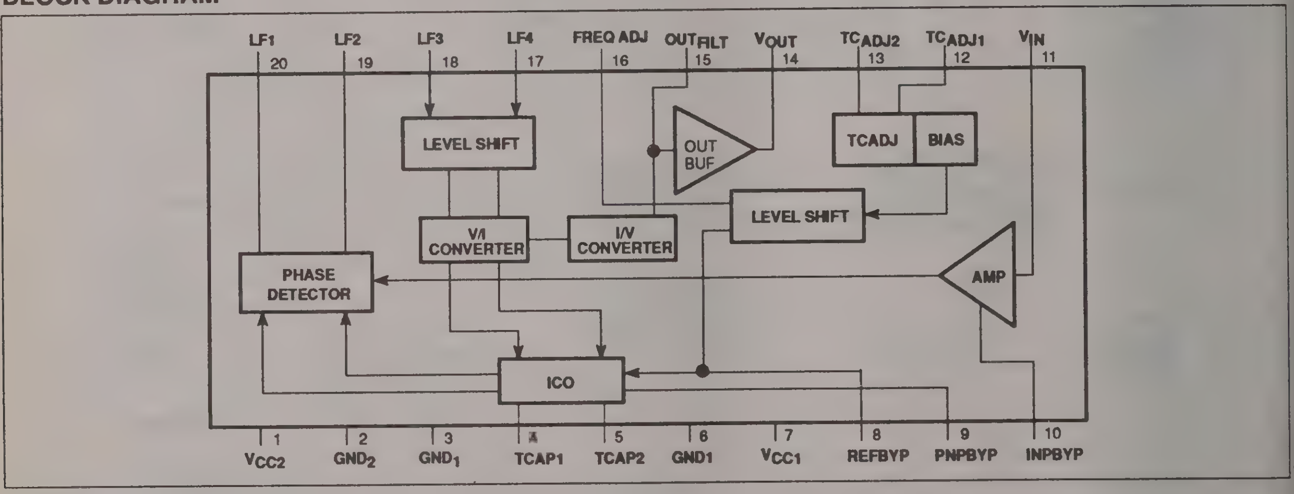
- Satellite receivers
- Fiber optic video links
- VHF FSK demodulators
- Clock Recovery

PIN CONFIGURATION


D, N Packages
V_{CC2} 1
GND_2 2
GND_1 3
TCAP1 4
TCAP2 5
GND1 6
V_{CC1} 7
REFBYP 8
PNPBYP 9
INPBYP 10
20 LF1
19 LF2
18 LF3
17 LF4
16 FREQ ADJ
15 OUT_{FILT}
14 V_{OUT}
13 TC_{ADJ2}
12 TC_{ADJ1}
11 V_{IN}
CD13070S
TOP VIEW

Philips

BLOCK DIAGRAM


LF1 20
LF2 19
LF3 18
LF4 17
FREQ ADJ 16
OUT_{FILT} 15
V_{OUT} 14
TC_{ADJ2} 13
TC_{ADJ1} 12
V_{IN} 11
LEVEL SHIFT
OUT BUF
TCADJ
BIAS
LEVEL SHIFT
V/I CONVERTER
I/V CONVERTER
PHASE DETECTOR
AMP
ICO
1 V_{CC2}
2 GND_2
3 GND_1
4 TCAP1
5 TCAP2
6 GND1
7 V_{CC1}
8 REFBYP
9 PNPBYP
10 INPBYP

NOTE:

1. Pins 4 and 5 can tolerate 1000V only, and all other pins, greater than 2000V for ESD (human body model).

04/15/92

Philips Semiconductors

PHILIPS

NE/SA600 – 1GHz LNA and Mixer

DESCRIPTION

The NE/SA600 is a combined low noise amplifier (LNA) and mixer designed for high-performance low-power communication systems from 800-1200MHz. The low-noise preamplifier has a 2dB noise figure at 900MHz with 16dB gain and an IM_3 intercept of -10dBm at the input. Input and output impedances are 50Ω and the gain is stabilized by on-chip compensation to vary less than ±0.5dB over the -40 to +85°C temperature range. The wide-dynamic-range mixer has a 14dB noise figure and IM_3 intercept of +6dBm at the input at 900MHz. Mixer input impedance is 50Ω with an open-collector output. The chip incorporates an option so the LNA can be disabled and replaced by a through connection. The amplifier IM_3 intercept increases to +26dBm in this mode; thus, large signals can be handled. The nominal current drawn from a single 5V supply is 13mA and 4.2mA in the LNA thru mode.

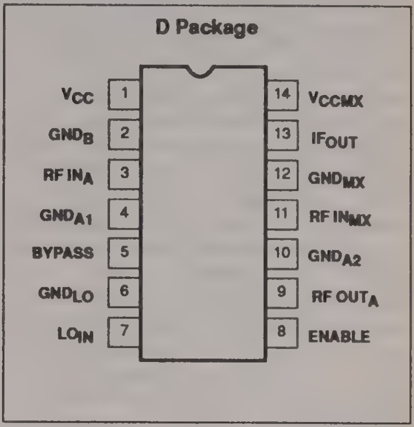
FEATURES

- Low current consumption: 13mA nominal, 4.2mA in the LNA thru mode
- Excellent noise figure: 2dB for the amplifier and 14dB for the mixer at 900MHz
- Excellent gain stability versus temperature
- Switchable overload capability
- Amplifier matched to 50Ω
- Mixer input matched to 50Ω
- Oscillator input matched to 50Ω

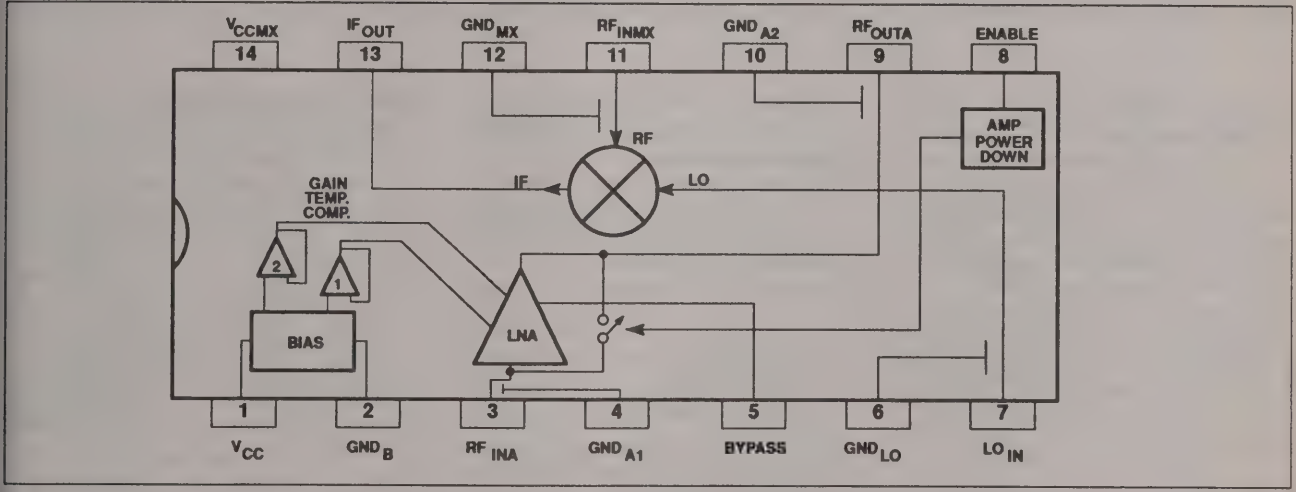
APPLICATIONS

- 900MHz front end for GSM/AMPS/TACS/ hand-held units
- RF data links
- UHF frequency conversion
- Portable radio
- Spread spectrum receivers
- 900MHz cordless phones

PIN CONFIGURATION


D Package
V_{CC} 1
GND_B 2
RF IN_A 3
GND_{A1} 4
BYPASS 5
GND_{LO} 6
LO_{IN} 7
14 V_{CCMX}
13 IF_{OUT}
12 GND_{MX}
11 RF IN_{MX}
10 GND_{A2}
9 RF OUT_A
8 ENABLE

BLOCK DIAGRAM


V_{CCMX} 14
IF_{OUT} 13
GND_{MX} 12
RF_{INMX} 11
GND_{A2} 10
RF_{OUTA} 9
ENABLE 8
AMP POWER DOWN
RF
IF
LO
GAIN TEMP. COMP.
2
1
BIAS
LNA
1 V_{CC}
2 GND_B
3 RF_{INA}
4 GND_{A1}
5 BYPASS
6 GND_{LO}
7 LO_{IN}

08-92/07458

Philips Semiconductors

PHILIPS

NE/SA602A – Double-Balanced Mixer and Oscillator

DESCRIPTION

The NE/SA602A is a low-power VHF monolithic double-balanced mixer with input amplifier, on-board oscillator, and voltage regulator. It is intended for high performance, low power communication systems. The guaranteed parameters of the SA602A make this device particularly well suited for cellular radio applications. The mixer is a "Gilbert cell" multiplier configuration which typically provides 18dB of gain at 45MHz. The oscillator will operate to 200MHz. It can be configured as a crystal oscillator, a tuned tank oscillator, or a buffer for an external LO. For higher frequencies the LO input may be externally driven. The noise figure at 45MHz is typically less than 5dB. The gain, intercept performance, low-power and noise characteristics make the NE/SA602A a superior choice for high-performance battery operated equipment. It is available in an 8-lead dual in-line plastic package and an 8-lead SO (surface-mount miniature package).

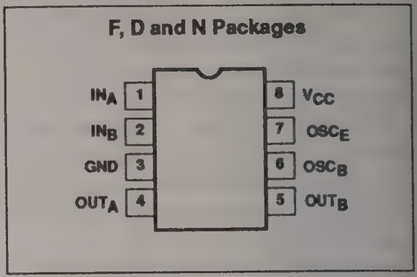
FEATURES

- Low current consumption: 2.4mA typical
- Excellent noise figure: <4.7dB typical at 45MHz
- High operating frequency
- Excellent gain, intercept and sensitivity
- Low external parts count; suitable for crystal/ceramic filters
- SA602A meets cellular radio specifications

APPLICATIONS

- Cellular radio mixer/oscillator
- Portable radio
- VHF transceivers
- RF data links
- HF/VHF frequency conversion
- Instrumentation frequency conversion
- Broadband LANs

PIN CONFIGURATION


F, D and N Packages
IN_A 1
IN_B 2
GND 3
OUT_A 4
8 V_{CC}
7 OSC_E
6 OSC_B
5 OUT_B

04/17/90

NE/SA604A – High Performance Low Power FM IF System

DESCRIPTION

The NE/SA604A is an improved monolithic low-power FM IF system incorporating two limiting intermediate frequency amplifiers, quadrature detector, muting, logarithmic received signal strength indicator, and voltage regulator. The NE/SA604A features higher IF bandwidth (25MHz) and temperature compensated RSSI and limiters permitting higher performance application compared with the NE/SA604. The NE/SA604A is available in a 16-lead dual-in-line plastic and 16-lead SO (surface-mounted miniature) package.

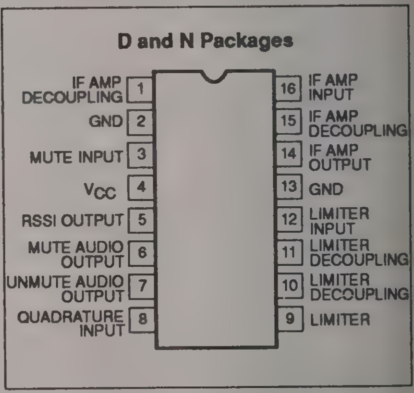
FEATURES

- Low power consumption: 3.3mA typical
- Temperature compensated logarithmic Received Signal Strength Indicator (RSSI) with a dynamic range in excess of 90dB
- Two audio outputs - muted and unmuted
- Low external component count; suitable for crystal/ceramic filters
- Excellent sensitivity: 1.5µV across input pins (0.22µV into 50Ω matching network) for 12dB SINAD (Signal to Noise and Distortion ratio) at 455kHz
- SA604A meets cellular radio specifications

APPLICATIONS

- Cellular radio FM IF
- High performance communications receivers
- Intermediate frequency amplification and detection up to 25MHz
- RF level meter
- Spectrum analyzer
- Instrumentation
- FSK and ASK data receivers

PIN CONFIGURATION


D and N Packages
IF AMP DECOUPLING 1
GND 2
MUTE INPUT 3
V_{CC} 4
RSSI OUTPUT 5
MUTE AUDIO OUTPUT 6
UNMUTE AUDIO OUTPUT 7
QUADRATURE INPUT 8
16 IF AMP INPUT
15 IF AMP DECOUPLING
14 IF AMP OUTPUT
13 GND
12 LIMITER INPUT
11 LIMITER DECOUPLING
10 LIMITER DECOUPLING
9 LIMITER

11/03/92

Philips Semiconductors

PHILIPS

NE/SA612A – Double-Balanced Mixer and Oscillator

DESCRIPTION

The NE/SA612A is a low-power VHF monolithic double-balanced mixer with on-board oscillator and voltage regulator. It is intended for low cost, low power communication systems with signal frequencies to 500MHz and local oscillator frequencies as high as 200MHz. The mixer is a "Gilbert cell" multiplier configuration which provides gain of 14dB or more at 45MHz.

The oscillator can be configured for a crystal, a tuned tank operation, or as a buffer for an external L.O. Noise figure at 45MHz is typically below 6dB and makes the device well suited for high performance cordless phone/cellular radio. The low power consumption makes the NE/SA612A excellent for battery operated equipment. Networking and other communications products can benefit from very low radiated energy levels within systems. The NE/SA612A is available in an 8-lead dual in-line plastic package and an 8-lead SO (surface mounted miniature package).

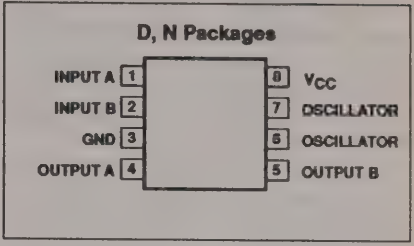
FEATURES

- Low current consumption
- Low cost
- Operation to 500MHz
- Low radiated energy
- Low external parts count; suitable for crystal/ceramic filter
- Excellent sensitivity, gain, and noise figure

APPLICATIONS

- Cordless telephone
- Portable radio
- VHF transceivers
- RF data links
- Sonabuoys
- Communications receivers
- Broadband LANs
- HF and VHF frequency conversion
- Cellular radio mixer/oscillator

PIN CONFIGURATION


D, N Packages
INPUT A 1
INPUT B 2
GND 3
OUTPUT A 4
8 V_{CC}
7 OSCILLATOR
6 OSCILLATOR
5 OUTPUT B

09/17/90

NE/SA614A – Low Power FM IF System

DESCRIPTION

The NE/SA614A is an improved monolithic low-power FM IF system incorporating two limiting intermediate frequency amplifiers, quadrature detector, muting, logarithmic received signal strength indicator, and voltage regulator. The NE/SA614A features higher IF bandwidth (25MHz) and temperature compensated RSSI and limiters permitting higher performance application compared with the NE/SA604. The NE/SA614A is available in a 16-lead dual-in-line plastic and 16-lead SO (surface-mounted miniature) package.

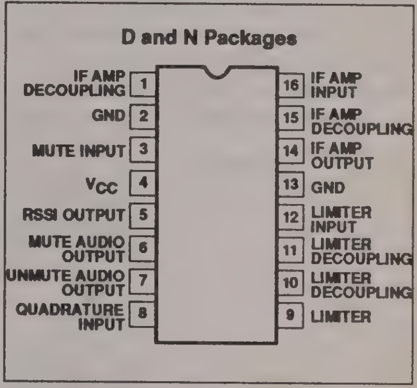
FEATURES

- Low power consumption: 3.3mA typical
- Temperature compensated logarithmic Received Signal Strength Indicator (RSSI) with a dynamic range in excess of 90dB
- Two audio outputs - muted and unmuted
- Low external component count; suitable for crystal/ceramic filters
- Excellent sensitivity: 1.5µV across input pins (0.22µV into 50Ω matching network) for 12dB SINAD (Signal to Noise and Distortion ratio) at 455kHz
- SA614A meets cellular radio specifications

APPLICATIONS

- Cellular radio FM IF
- High performance communications receivers
- Intermediate frequency amplification and detection up to 25MHz
- RF level meter
- Spectrum analyzer
- Instrumentation
- FSK and ASK data receivers

PIN CONFIGURATION


D and N Packages
IF AMP DECOUPLING 1
GND 2
MUTE INPUT 3
V_{CC} 4
RSSI OUTPUT 5
MUTE AUDIO OUTPUT 6
UNMUTE AUDIO OUTPUT 7
QUADRATURE INPUT 8
16 IF AMP INPUT
15 IF AMP DECOUPLING
14 IF AMP OUTPUT
13 GND
12 LIMITER INPUT
11 LIMITER DECOUPLING
10 LIMITER DECOUPLING
9 LIMITER

11/03/92

Philips Semiconductors

PHILIPS

NE/SA605 and NE/SA615 – High Performance Low Power Mixer FM IF System

DESCRIPTION

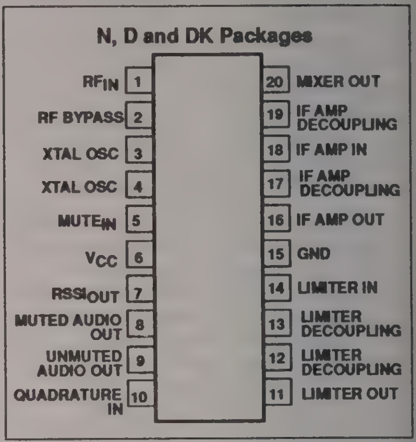
The NE/SA605 and NE/SA615 are high performance monolithic low-power FM IF systems incorporating a mixer/oscillator, two limiting intermediate frequency amplifiers, quadrature detector, muting, logarithmic received signal strength indicator (RSSI), and voltage regulator. The NE/SA605 and NE/SA615 combine the functions of Philips Semiconductors NE602 and NE604A, but feature a higher mixer input intercept point, higher IF bandwidth (25MHz) and temperature compensated RSSI and limiters permitting higher performance application. The NE/SA605 and NE/SA615 are available in 20-lead dual-in-line plastic, 20-lead SOL (surface-mounted miniature package) and 20-lead SSOP (shrink small outline package).

The NE/SA605 and NE/SA615 are functionally the same device types. The difference between the two devices lies in the guaranteed specifications. The NE/SA615 has a higher I_{CC}, lower input third order intercept point, lower conversion mixer gain, lower limiter gain, lower AM rejection, lower SINAD, higher THD, and higher RSSI error than the NE/SA605. Both the NE/SA605 and NE/SA615 devices will meet the EIA specifications for AMPS and TACS cellular radio applications.

FEATURES

- Low power consumption: 5.7mA typical at 6V
- Mixer input to >500MHz
- Mixer conversion power gain of 13dB at 45MHz
- Mixer noise figure of 4.6dB at 45MHz
- XTAL oscillator effective to 150MHz (L.C. oscillator to 1GHz local oscillator can be injected)
- 102dB of IF Amp/Limiter gain
- 25MHz limiter small signal bandwidth
- Temperature compensated logarithmic Received Signal Strength Indicator (RSSI) with a dynamic range in excess of 90dB
- Two audio outputs - muted and unmuted
- Low external component count; suitable for crystal/ceramic/LC filters
- Excellent sensitivity: 0.22µV into 50Ω matching network for 12dB SINAD (Signal to Noise and Distortion ratio) for 1kHz tone with RF at 45MHz and IF at 455kHz
- SA605 meets cellular radio specifications
- ESD hardened

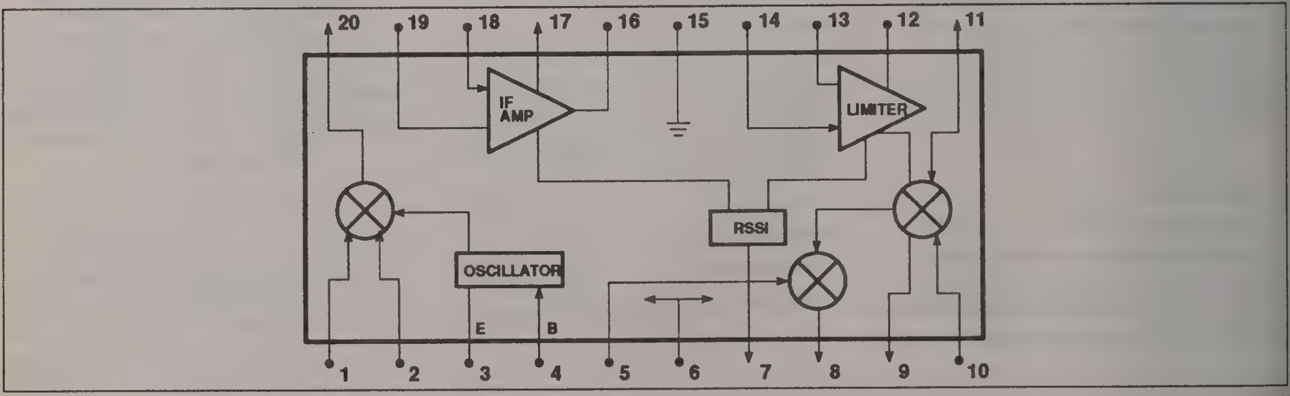
PIN CONFIGURATION


N, D and DK Packages
RFIN 1
RF BYPASS 2
XTAL OSC 3
XTAL OSC 4
MUTEIN 5
VCC 6
RSSIOUT 7
MUTED AUDIO OUT 8
UNMUTED AUDIO OUT 9
QUADRATURE IN 10
20 MIXER OUT
19 IF AMP DECOUPLING
18 IF AMP IN
17 IF AMP DECOUPLING
16 IF AMP OUT
15 GND
14 LIMITER IN
13 LIMITER DECOUPLING
12 LIMITER DECOUPLING
11 LIMITER OUT

APPLICATIONS

- Cellular radio FM IF
- High performance communications receivers
- Single conversion VHF/UHF receivers
- SCA receivers
- RF level meter
- Spectrum analyzer
- Instrumentation
- FSK and ASK data receivers
- Log amps
- Wideband low current amplification

BLOCK DIAGRAM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IF AMP
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RSSI
OSCILLATOR
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11/03/92

Philips Semiconductors

PHILIPS

NE/SA625 – High Perfromance Low Power Mixer RF IF System with High-Speed RSSI

DESCRIPTION

The NE/SA625 is pin-to-pin compatible with the NE/SA605, but has faster RSSI rise and fall times. The NE/SA625 is a high performance monolithic low-power FM IF system incorporating a mixer/oscillator, two limiting intermediate frequency amplifiers, quadrature detector, muting, logarithmic received signal strength indicator (RSSI) with fast rise and fall time, and voltage regulator. The NE/SA625 combines the functions of Signetics' NE602A and NE624. The NE/SA625 is available in 20-lead dual-in-line plastic and 20-lead SOL (surface-mounted miniature package) and 20-lead SSOP (shrink small outline package).

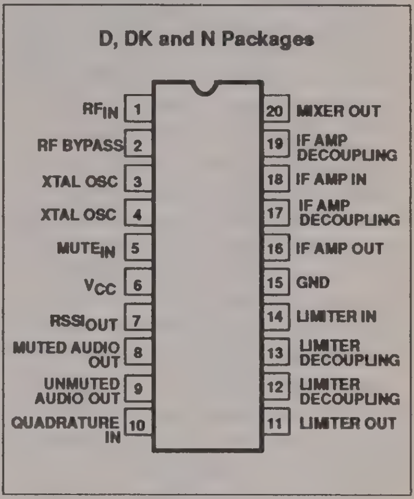
FEATURES

- Fast RSSI rise and fall times
- Low power consumption: 5.8mA typical at 6V
- Mixer input to >500MHz
- Mixer conversion power gain of 13dB at 45MHz
- Mixer noise figure of 4.6dB at 45MHz
- XTAL oscillator effective to 150MHz (L.C. oscillator to 1GHz local oscillator can be injected)
- 102dB of IF Amp/Limiter gain
- 25MHz limiter small signal bandwidth
- Temperature compensated logarithmic Received Signal Strength Indicator (RSSI) with a dynamic range in excess of 90dB
- Two audio outputs - muted and unmuted
- Low external component count; suitable for crystal/ceramic/LC filters
- Excellent sensitivity: 0.22µV into 50Ω matching network for 12dB SINAD (Signal to Noise and Distortion ratio) for 1kHz tone with RF at 45MHz and IF at 455kHz
- SA625 meets cellular radio specifications
- ESD hardened

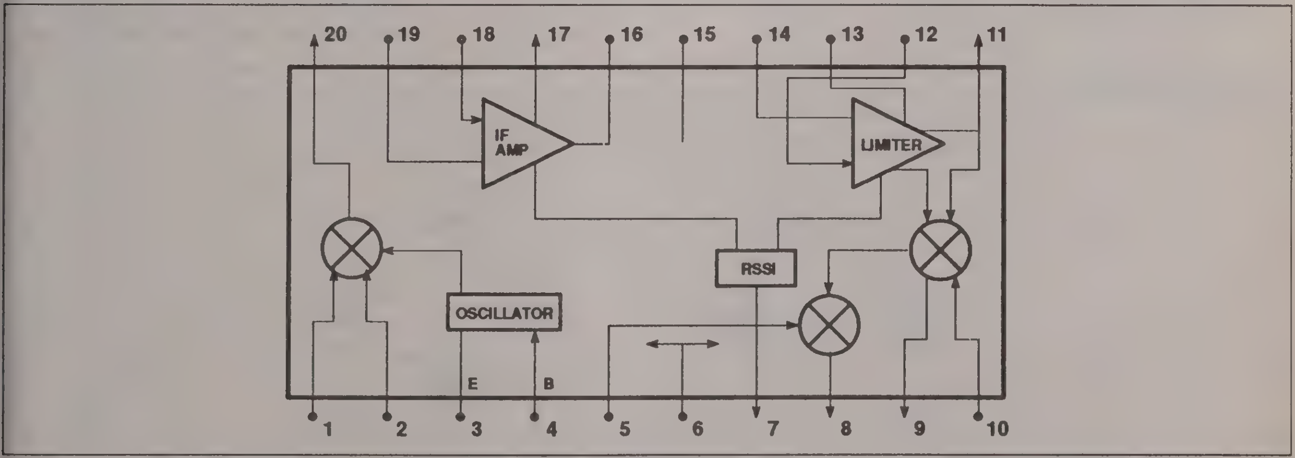
APPLICATIONS

- Digital cellular base stations
- High performance communications receivers
- Single conversion VHF/UHF receivers
- SCA receivers
- RF level meter
- Spectrum analyzer
- Instrumentation
- FSK and ASK data receivers
- Log amps
- Wideband low current amplification
- Digital cordless telephones

PIN CONFIGURATION


D, DK and N Packages
RF_{IN} 1
RF BYPASS 2
XTAL OSC 3
XTAL OSC 4
$MUTE_{IN}$ 5
V_{CC} 6
$RSSI_{OUT}$ 7
MUTED AUDIO OUT 8
UNMUTED AUDIO OUT 9
QUADRATURE IN 10
20 MIXER OUT
19 IF AMP DECOUPLING
18 IF AMP IN
17 IF AMP DECOUPLING
16 IF AMP OUT
15 GND
14 LIMITER IN
13 LIMITER DECOUPLING
12 LIMITER DECOUPLING
11 LIMITER OUT

BLOCK DIAGRAM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IF AMP
LIMITER
RSSI
OSCILLATOR
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11/03/92

Philips Semiconductors

PHILIPS

SA626 – Low Voltage High Performance Mixer FM IF System with High-Speed RSSI

DESCRIPTION

The SA626 is a low-voltage high performance monolithic FM IF system incorporating a mixer/oscillator, two limiting intermediate frequency amplifiers, quadrature detector, high speed logarithmic received signal strength indicator (RSSI), voltage regulator and audio and fast RSSI op amps. The SA626 is available in 20-lead SOL (surface-mounted small outline large package) and 20-lead SSOP (shrink small outline package).

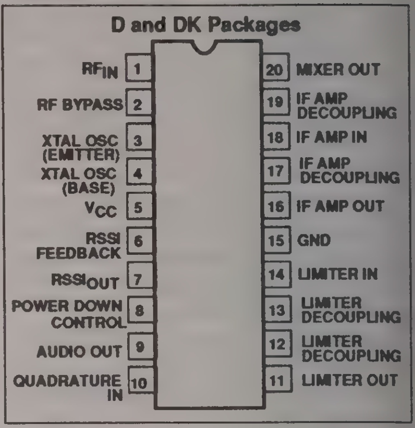
The SA626 was designed for high bandwidth portable communication applications and will function down to 2.7V. The RF section is similar to the famous NE605. The audio and RSSI outputs have amplifiers. The RSSI output has access to the feedback pin. This enables the designer to level adjust the outputs or add filtering.

SA626 incorporates a power down mode which powers down the device when Pin 8 is low. Power down logic levels are CMOS and TTL compatible with high input impedance.

FEATURES

- Fast RSSI rise and fall times
- Low power consumption: 6.5mA typ at 3V
- Power down mode (I_{CC} = 200µA)
- Mixer input to >500MHz
- Mixer conversion power gain of 11dB at 240MHz
- Mixer noise figure of 14dB at 240MHz
- XTAL oscillator effective to 150MHz (L.C. oscillator to 1GHz local oscillator can be injected)
- 92dB of IF Amp/Limiter power gain
- 25MHz limiter small signal bandwidth
- Temperature compensated logarithmic Received Signal Strength Indicator (RSSI) with a dynamic range in excess of 90dB
- Audio output internal op amp
- RSSI output internal op amp
- Internal op amps with rail-to-rail outputs
- 10.7MHz filter matching (330Ω) reduces external component count; suitable for crystal/ceramic/LC filters
- Excellent sensitivity: 0.54µV into 50Ω matching network for 12dB SINAD (Signal to Noise and Distortion ratio) for 1kHz tone with RF at 240MHz and IF at 10.7MHz
- SA626 meets cellular radio specifications
- ESD hardened

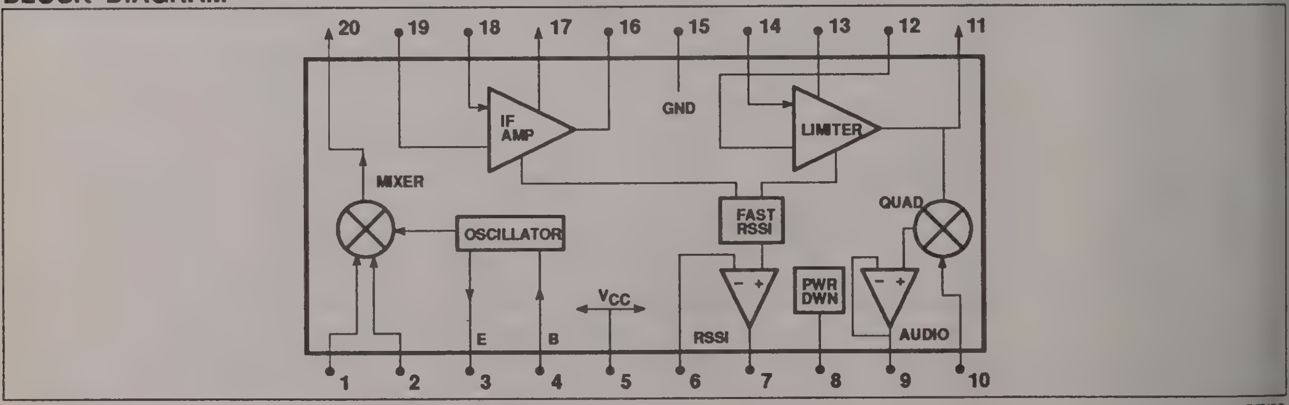
PIN CONFIGURATION


D and DK Packages
RF$_{IN}$ 1
RF BYPASS 2
XTAL OSC (EMITTER) 3
XTAL OSC (BASE) 4
V_{CC} 5
RSSI FEEDBACK 6
RSSI$_{OUT}$ 7
POWER DOWN CONTROL 8
AUDIO OUT 9
QUADRATURE IN 10
20 MIXER OUT
19 IF AMP DECOUPLING
18 IF AMP IN
17 IF AMP DECOUPLING
16 IF AMP OUT
15 GND
14 LIMITER IN
13 LIMITER DECOUPLING
12 LIMITER DECOUPLING
11 LIMITER OUT

APPLICATIONS

- Digital cordless telephones
- Digital cellular telephones
- Digital cellular base stations
- Portable high performance communications receivers
- Single conversion VHF/UHF receivers
- SCA receivers
- RF level meter
- Spectrum analyzer
- Instrumentation
- FSK and ASK data receivers
- Log amps
- Wideband low current amplification

BLOCK DIAGRAM


20
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IF AMP
GND
LIMITER
MIXER
FAST RSSI
QUAD
OSCILLATOR
V_{CC}
PWR DWN
E
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RSSI
AUDIO
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Philips Semiconductors

PHILIPS

NE/SA630 – Single Pole Double Throw (SPDT) Switch

DESCRIPTION

The NE630 is a wideband RF switch fabricated in BiCMOS technology and incorporating on-chip CMOS/TTL compatible drivers. Its primary function is to switch signals in the frequency range DC - 1GHz from one 50Ω channel to another. The switch is activated by a CMOS/TTL compatible signal applied to the enable channel 1 pin (ENCH1).

The extremely low current consumption makes the NE/SA630 ideal for portable applications. The excellent isolation and low loss makes this a suitable replacement for PIN diodes.

The NE/SA630 is available in an 8-pin dual in-line plastic package and an 8-pin SO (surface mounted miniature) package.

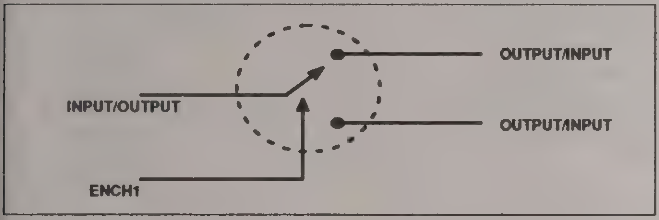
FEATURES

- Wideband (DC - 1GHz)
- Low through loss (1dB typical at 200MHz)
- Unused input is terminated internally in 50Ω
- Excellent overload capability (1dB gain compression point +18dBm at 300MHz)
- Low DC power (170µA from 5V supply)
- Fast switching (20ns typical)
- Good isolation (off channel isolation 60dB at 100MHz)
- Low distortion (IP_3 intercept +33dBm)
- Good 50Ω match (return loss 18dB at 400MHz)
- Full ESD protection
- Bidirectional operation

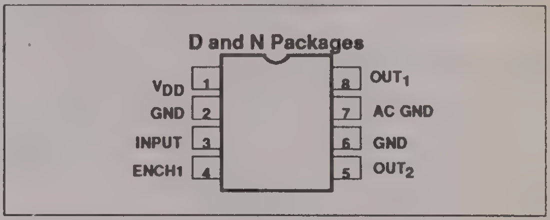
APPLICATIONS

- Digital transceiver front-end switch
- Antenna switch
- Filter selection
- Video switch
- FSK transmitter

NE/SA630 BLOCK DIAGRAM



PIN CONFIGURATION



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Philips Semiconductors

PHILIPS

SA701 – Divide by: 128/129-64/65 Dual Modulus Low Power ECL Prescaler
SA702 – Divide by: 64/65/72 Triple Modulus Low Power ECL Prescaler
SA703 – Divide by: 128/129/144 Triple Modulus Low Power ECL Prescaler

FEATURES

- Low voltage operation
- Low current consumption
- Operation up to 1.1GHz
- ESD hardened

APPLICATIONS

- Cellular phones
- Cordless phones
- RF LANs
- Test and measurement
- Military radio
- VHF/UHF mobile radio
- VHF/UHF hand-held radio

SA701 DESCRIPTION

The SA701 is an advanced dual modulus (Divide By 128/129 or 64/65) low power ECL prescaler. The minimum supply voltage is 2.7V and is compatible with the new CMOS UMF1005 and UMF1009 synthesizers from Philips and other logic circuits. The low supply current allows application in battery operated low-power equipment. Maximum input signal frequency is 1.1GHz for cellular and other land mobile applications. There is no lower frequency limit due to a fully static design. The circuit is implemented in ECL technology on the QUBiC process. The circuit will be available in an 8-pin SO package with 150 mil package width and in 8-pin dual-in-line plastic package, and is pin compatible with Fujitsu MB501, Plessey SP8704 and Motorola MC12022.

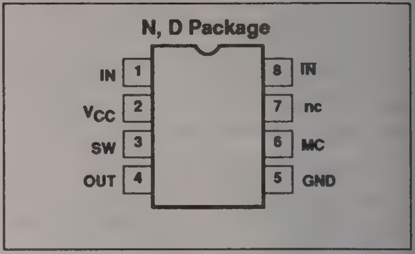
SA702 DESCRIPTION

The SA702 triple modulus (Divide By 64/65/72) low power ECL prescaler is used in synthesizer systems to achieve low phase lock time, broad operating range, high reference frequency and small frequency step sizes. The minimum supply voltage is 2.7V and is compatible with the CMOS UMA1005 synthesizer from Philips and other logic circuits. The low supply current allows application in battery operated low-power equipment. Maximum input signal frequency is 1.1GHz for cellular and other land mobile applications. There is no lower frequency limit due to a fully static design. The circuit is implemented in ECL technology on the QUBiC process. The circuit will be available in an 8-pin SO package with 150 mil package width and in 8-pin dual in-line plastic package.

SA703 DESCRIPTION

The SA703 triple modulus (Divide By 128/129/144) low power ECL prescaler is used in synthesizer systems to achieve low phase lock time, broad operating range, high reference frequency and small frequency step sizes. The minimum supply voltage is 2.7V and is compatible with the UMA1005 synthesizer from Philips and other logic circuits. The low supply current allows application in battery operated low-power equipment. Maximum input signal frequency is 1.1GHz for cellular and other land mobile applications. There is no lower frequency limit due to a fully static design. The circuit is implemented in ECL technology on the QUBiC process. The circuit will be available in an 8-pin SO package with 150 mil package width and in 8-pin dual in-line plastic package.

SA701
PIN CONFIGURATION



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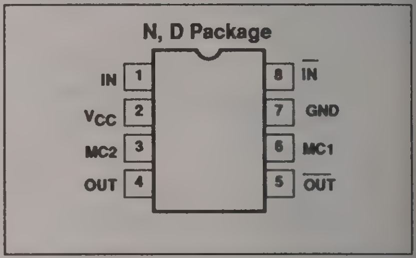
SA702 AND SA703
PIN CONFIGURATION



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Philips Semiconductors

PHILIPS

NE/SA5200 – RF Dual Gain-Stage

DESCRIPTION

The NE/SA5200 is a dual amplifier with DC to 1200MHz response. Low noise (NF = 3.6dB) makes this part ideal for RF front-ends, and a simple power-down mode saves current for battery operated equipment. Inputs and outputs are matched to 50Ω.

The enable pin allows the designer the ability to turn the amplifiers on or off, allowing the part to act as an amplifier as well as an attenuator. This is very useful for front-end buffering in receiver applications.

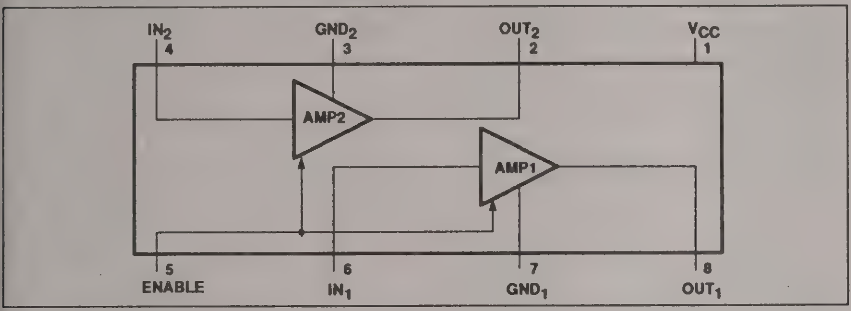
FEATURES

- Dual amplifiers
- DC - 1200MHz operation
- Low DC power consumption (4.2mA per amplifier @ V_{CC} = 5V)
- Power-Down Mode (I_{CC} = 95μA typical)
- 3.6dB noise figure at 900MHz
- Unconditionally stable
- Fully ESD protected
- Low cost
- Supply voltage 4-9V
- Gain S_{21} = 7dB at f = 1GHz
- Input and output match S_{11}, S_{22} typically <–14dB

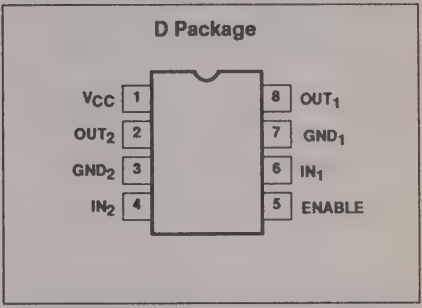
APPLICATIONS

- Cellular radios
- RF IF strips
- Portable equipment

NE/SA5200 BLOCK DIAGRAM



PIN CONFIGURATION



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NE/SA5209/5219 – Wideband Variable Gain Amplifiers

DESCRIPTION

The NE5209/5219 products represent a breakthrough in monolithic amplifier design featuring several innovations. This unique design has combined the advantages of a high speed bipolar process with the proven Gilbert architecture.

The NE5209/5219 are linear broadband RF amplifiers whose gain is controlled by a single DC voltage. The amplifier runs off a single 5 volt supply and consumes only 40mA. The amplifier has high impedance (1kΩ) differential inputs. The output is 50Ω differential. Therefore, the products can simultaneously perform AGC, impedance transformation, and the balun functions.

The dynamic range is excellent over a wide range of gain setting. Furthermore, the noise performance degrades at a comparatively slow rate as the gain is reduced. This is an important feature when building linear AGC systems.

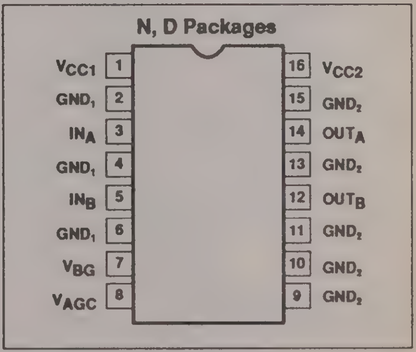
FEATURES

- Gain to 1.5GHz
- 850MHz bandwidth for NE/SA5209; 700MHz bandwidth for NE/SA5219
- High impedance differential input
- 50Ω differential output
- Single 5V power supply
- 0 - 1V gain control pin
- >60dB gain control range at 200MHz
- 26dB maximum gain differential
- Exceptional $V_{CONTROL}$ / V_{GAIN} linearity
- 7dB noise figure minimum
- Full ESD protection
- Easily cascadable

APPLICATIONS

- Linear AGC systems
- Very linear AM modulator
- RF balun
- Cable TV multi-purpose amplifier
- Fiber optic AGC
- RADAR
- User programmable fixed gain block
- Video
- Satellite receivers
- Cellular communications

PIN CONFIGURATION



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Philips Semiconductors

PHILIPS

NE/SA577 – Unity Gain Level Programmable Low Power Compandor

DESCRIPTION

The NE/SA577 is a unity gain level programmable compandor designed for low power applications. The NE577 is internally configured as an expandor and a compressor to minimize external component count.

The NE577 is available in a 14-pin plastic DIP and an SO package.

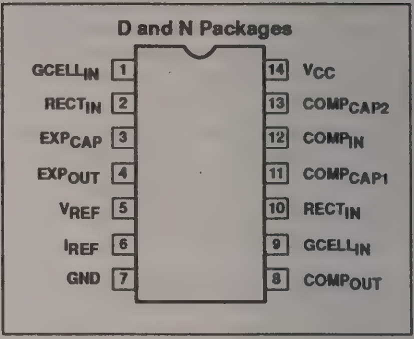
FEATURES

- Operating voltage range: 1.8V to 7V
- Low power consumption (1.4mA @ 3.6V)
- 0dB level programmable(10mV$_{RMS}$ to 1.0V$_{RMS}$)
- Over 90dB of dynamic range
- Wide input/output swing capability (rail-to-rail)
- Low external component count
- SA577 meets cellular radio specifications
- ESD hardened

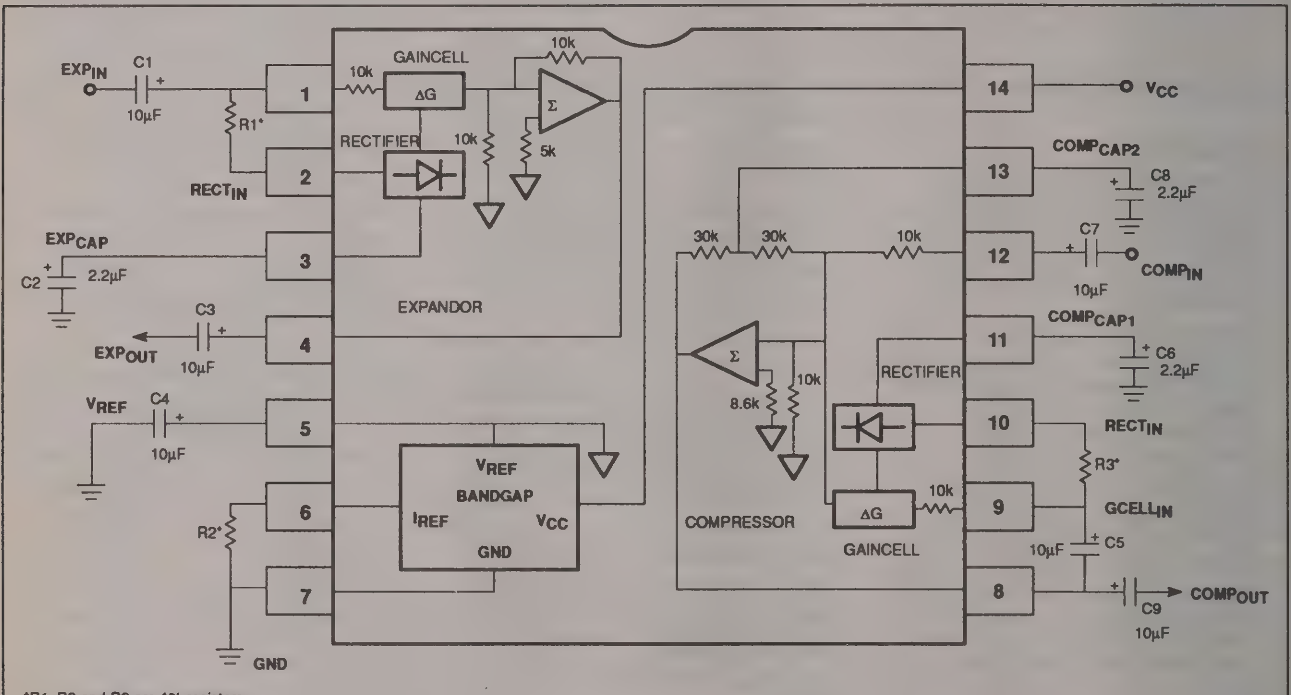
APPLICATIONS

- High performance portable communications
- Cellular radio
- Cordless telephone
- Consumer audio
- Wireless microphones
- Modems
- Electric organs
- Hearing aids
- Automatic level control (ALC)

PIN CONFIGURATION


D and N Packages
GCELL$_{IN}$ 1
RECT$_{IN}$ 2
EXP$_{CAP}$ 3
EXP$_{OUT}$ 4
V$_{REF}$ 5
I$_{REF}$ 6
GND 7
14 V$_{CC}$
13 COMP$_{CAP2}$
12 COMP$_{IN}$
11 COMP$_{CAP1}$
10 RECT$_{IN}$
9 GCELL$_{IN}$
8 COMP$_{OUT}$

NE/SA577 BLOCK DIAGRAM AND TEST CIRCUIT


EXP$_{IN}$
C1
10µF
R1*
RECT$_{IN}$
EXP$_{CAP}$
C2
2.2µF
C3
EXP$_{OUT}$
10µF
V$_{REF}$
C4
10µF
R2*
GND
1
2
3
4
5
6
7
10k
GAINCELL
ΔG
10k
RECTIFIER
10k
Σ
5k
EXPANDOR
V$_{REF}$
BANDGAP
I$_{REF}$
V$_{CC}$
GND
30k
30k
10k
Σ
8.6k
10k
COMPRESSOR
RECTIFIER
ΔG
10k
GAINCELL
14
13
12
11
10
9
8
V$_{CC}$
COMP$_{CAP2}$
C8
2.2µF
C7
COMP$_{IN}$
10µF
COMP$_{CAP1}$
C6
2.2µF
RECT$_{IN}$
R3*
GCELL$_{IN}$
10µF
C5
COMP$_{OUT}$
C9
10µF

*R1, R2 and R3 are 1% resistors.

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Philips Semiconductors

PHILIPS

NE/SA606 and NE/SA616 –
Low-Voltage High Performance Mixer FM IF Systems

DESCRIPTION

The NE/SA606 and NE/SA616 are low-voltage high performance monolithic FM IF systems incorporating a mixer/oscillator, two limiting intermediate frequency amplifiers, quadrature detector, logarithmic received signal strength indicator (RSSI), voltage regulator and audio and RSSI op amps. The products are available in 20-lead dual-in-line plastic, 20-lead SOL (surface-mounted small outline large) and 20-lead SSOP (shrink small outline) packages.

These devices were designed for portable communication applications and will function down to 2.7V. The RF section is similar to the famous NE605/615. The audio and RSSI outputs have amplifiers with access to the feedback path. This enables the designer to level adjust the outputs or add filtering.

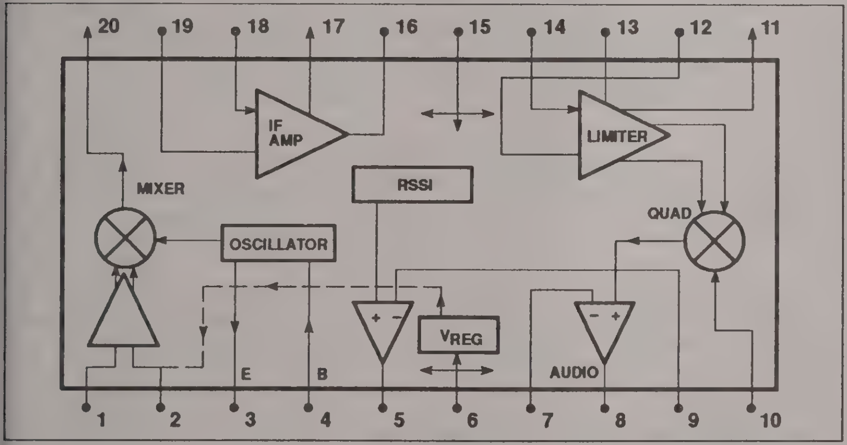
FEATURES

- Low power consumption: 3.5mA typical at 3V
- Mixer input to >150MHz
- Mixer conversion power gain of 17dB at 45MHz
- XTAL oscillator effective to 150MHz (L.C. oscillator or external oscillator can be used at higher frequencies)
- 102dB of IF Amp/Limiter gain
- 2MHz limiter small signal bandwidth
- Temperature compensated logarithmic Received Signal Strength Indicator (RSSI) with a 80dB to 90dB dynamic range
- Low external component count; suitable for crystal/ceramic/LC filters
- Excellent sensitivity: 0.31µV into 50Ω matching network for 12dB SINAD (Signal to Noise and Distortion ratio) for 1kHz tone with RF at 45MHz and IF at 455kHz
- SA606/616 meets cellular radio specifications
- Audio output internal op amp
- RSSI output internal op amp
- Internal op amps with rail-to-rail outputs
- ESD protection: Human Body Model 2kV
  Robot Model 200V

APPLICATIONS

- Portable cellular radio FM IF
- Cordless phones
- Wireless systems
- RF level meter
- Spectrum analyzer
- Instrumentation
- FSK and ASK data receivers
- Log amps
- Portable high performance communication receiver
- Single conversion VHF receivers

BLOCK DIAGRAM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IF AMP
LIMITER
MIXER
RSSI
QUAD
OSCILLATOR
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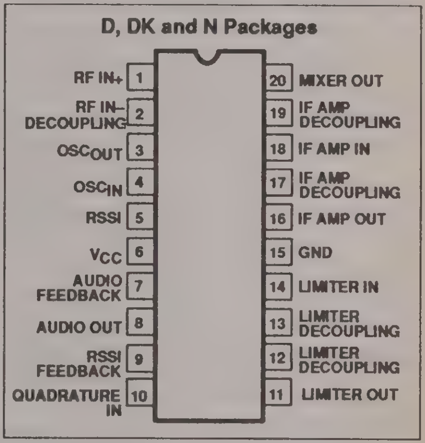
PIN CONFIGURATION


D, DK and N Packages
RF IN+ 1
RF IN– DECOUPLING 2
OSCOUT 3
OSCIN 4
RSSI 5
VCC 6
AUDIO FEEDBACK 7
AUDIO OUT 8
RSSI FEEDBACK 9
QUADRATURE IN 10
20 MIXER OUT
19 IF AMP DECOUPLING
18 IF AMP IN
17 IF AMP DECOUPLING
16 IF AMP OUT
15 GND
14 LIMITER IN
13 LIMITER DECOUPLING
12 LIMITER DECOUPLING
11 LIMITER OUT

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Philips Semiconductors

PHILIPS

SA5752 – Audio Processor – Companding, VOX and Amplifier Section

DESCRIPTION

The SA5752 is a high performance low power audio signal processing system especially designed to meet the requirements for small size and low voltage operation of hand-held equipment. The SA5752 subsystem includes a low noise microphone preamplifier with adustable gain, a noise cancellation switching amplifier with adjustable threshold, a voice operated transmitter (VOX) switch, VOX control, an audio compressor with buffered input, audio expandor, and an internal bandgap voltage regulator with power down capability. When used with Philips Semiconductors SA5753, the complete audio processing function of an AMPS or TACS cellular telephone is easily implemented. The system also meets the requirements of the proposed NAMPS or NTACS specifications. The SA5752 can also be used without the SA5753 in a wide variety of radio communications applications.

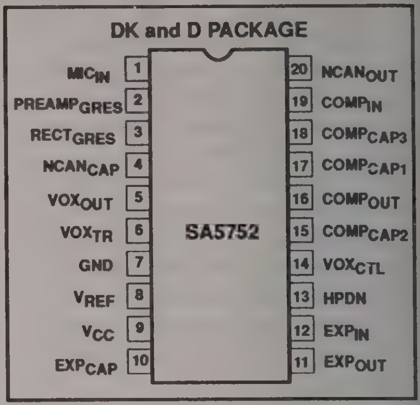
FEATURES

- Operating voltage range: 2V to 5.5V
- Miniature SSOP and SO packages
- High performance
- Adjustable VOX and noise cancellation threshold
- Adjustable gain preamplifier
- Audio companding
- ESD protected
- Open collector VOX output
- Logic inputs CMOS compatible
- Power down mode
- Few external components
- Meets AMPS/TACS/NAMPS/NTACS requirements

BENEFITS

- Very compact applications
- Long battery life in portable equipment
- Complete cellular audio function with the SA5753

PIN CONFIGURATION

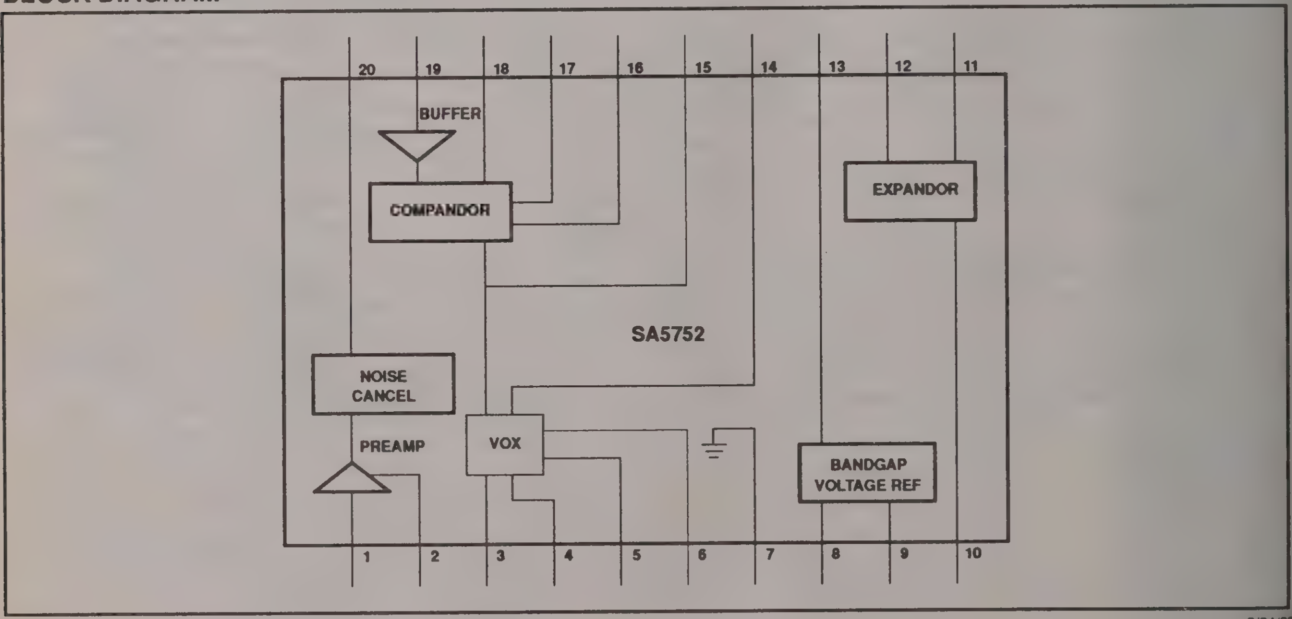

DK and D PACKAGE
MIC$_{IN}$ 1
PREAMP$_{GRES}$ 2
RECT$_{GRES}$ 3
NCAN$_{CAP}$ 4
VOX$_{OUT}$ 5
VOX$_{TR}$ 6
GND 7
V$_{REF}$ 8
V$_{CC}$ 9
EXP$_{CAP}$ 10
20 NCAN$_{OUT}$
19 COMP$_{IN}$
18 COMP$_{CAP3}$
17 COMP$_{CAP1}$
16 COMP$_{OUT}$
15 COMP$_{CAP2}$
14 VOX$_{CTL}$
13 HPDN
12 EXP$_{IN}$
11 EXP$_{OUT}$
SA5752

APPLICATIONS

- Cellular radio
- Mobile communications
- High performance cordless telephones
- 2-way radio

BLOCK DIAGRAM

Philips


20
19
18
17
16
15
14
13
12
11
BUFFER
COMPANDOR
EXPANDOR
SA5752
NOISE CANCEL
PREAMP
VOX
BANDGAP VOLTAGE REF
1
2
3
4
5
6
7
8
9
10

3/24/93

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SAA5252 – Line Twenty-one Acquisition and Display (LITOD)

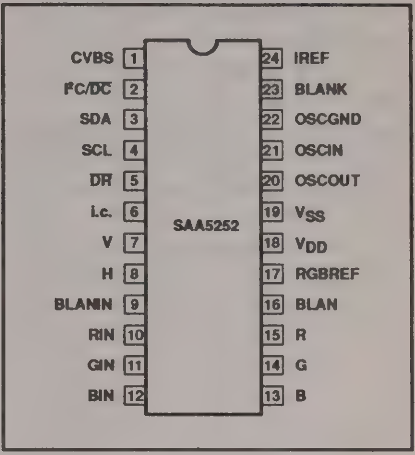
FEATURES

- Complete stand-alone Line 21 decoder in one package
- On-chip display RAM allowing full page Text mode
- Enhanced character display modes
- Full color captions
- RGB interface for standard color decoder ICs
- Automatic handling of Field 2 data
- Automatic selection of (1H, 1V), (2H, 1V) or (2H, 2V) scan modes
- Onboard OSD facility using Character generator
- RGB inputs to support existing OSD ICs
- I^{2}C-bus or “stand alone” pin control
- Automatic data-ready signal generation on data acquisition
- Can decode signals recorded on standard VHS and S-VHS tape.

GENERAL DESCRIPTION

The SAA5252 (LITOD) is a single-chip CMOS device which will acquire, decode and display Line 21 Closed Captioning data from a 525 line composite video signal. Operation as an On-Screen Display (OSD) device is also possible. Normal and line progressive scan modes are supported.

PIN CONFIGURATION



04/93-PRELIMINARY

SAA7169 – 35 MHz Triple 9-Bit D/A Converter for High-Speed Video

FEATURES

- CMOS circuit to convert high-speed video data from digital to analog
- Three equal 9-bit digital-to-analog converters
- Input signals TTL-compatible
- Input registers for positive edge-triggered data signals
- Clock frequency for a conversion rate up to 35MHz
- 20MHz analog bandwidth
- 2V (p-p) analog output voltage range without load on output (0.2 to 2.2 V_{DC})
- 1 V/75Ω outputs (0.1 to 1.1 V_{DC})
- No de-glitching circuit required
- Typical 225mW power dissipation

GENERAL DESCRIPTION

The triple high-speed D/A converter can be used in applications for:

- desktop video processing
- digital television
- graphic displays
- television decoders
- general high frequency conversion

FUNCTIONAL DESCRIPTION

The integrated monolithic CMOS circuit SAA7169 is a triple 9-bit digital-to-analog converter for high-speed video applications. Its three channels are equal. The maximum conversion rate is 35MHz.

The converters use a combination of resistor chains with low-impedance output buffers. The bottom output voltage is 200mV to reduce integral non-linearity errors. The analog signal, without load on output pin, is between 0.2 and 2.2V.

Each digital-to-analog converter has its own supply pin for purpose of decoupling. V_{DDA4} is the supply voltage for the resistor chains of the three DACs. The accuracy of this supply voltage influences directly the output amplitudes.

The current CUR into pin 5 is 0.3mA (V_{DDA4} = 5V, R_{5-6} = 15kΩ); a larger current improves the bandwidth but increases the integral non-linearity.

04/92-PRELIMINARY

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SAA7186 – Digital Video Scaler

FEATURES

- Scaling of video picture windows down to randomly sized windows
- Processes maximum 1023 pixels per line and 1023 lines per field
- Two-dimensional data processing for improved signal quality of scaled video data and for compression of video data
- 16-bit YUV input data buffer
- Interlace/non-interlace video data processing and field control
- Line memories in Y path and UV path to store two lines, each with 2 × 768 × 8 bit capacity
- Vertical sync processing by scale control
- Non-scaled mode to get full picture or to gate videotext lines
- UV input and output data binary/two's complement
- Switchable RGB matrix and anti-gamma ROMs
- 16-word FIFO register for 32-bit output data
- Output formats: 5-bit and 8-bit RGB, 8-bit YUV or 8-bit monochrome

GENERAL DESCRIPTION

The CMOS circuit SAA7186 scales and filters digital video data to randomly sized picture windows. YUV input data in 4:2:2 format are required (SAA7191B source).

05/93-PRELIMINARY

SAA7197 – Clock Signal Generator Circuit for Desktop Video Systems (SCGC)

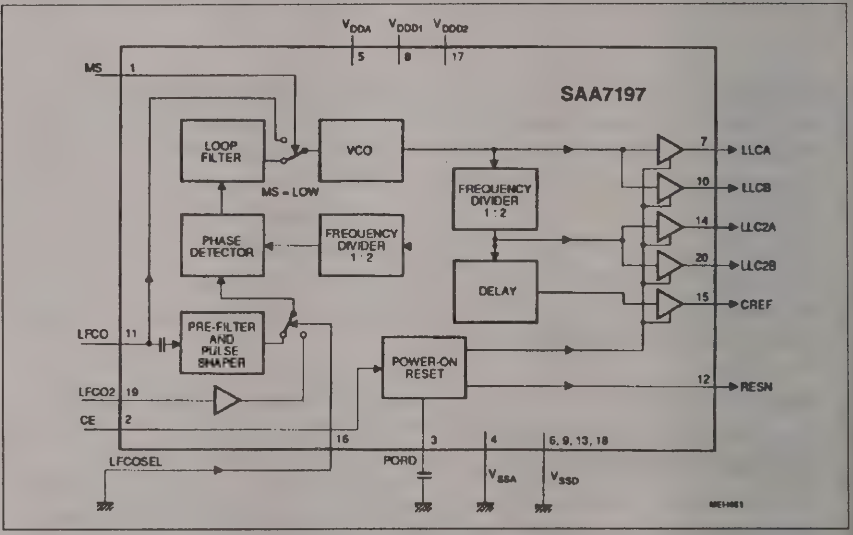
FEATURES

- Suitable for Desktop Video systems
- Two different sync sources selectable
- PLL frequency multiplier to generate 4 times of input frequency
- Dividers to generate clocks LLCA, LLCB, LLC2A and LLC2B (second and fourth multiples of input frequency)
- PLL mode or VCO mode selectable
- Reset control and power fail detection

GENERAL DESCRIPTION

The SAA7197 generates all clock signals required for a digital TV system suitable for the SAA719x family. The circuit operates in either the phase-locked loop mode (PLL) or voltage controlled oscillator mode (VCO).

BLOCK DIAGRAM


V_{DDA}
V_{DDD1}
V_{DDD2}
5
8
17
MS
1
SAA7197
LOOP FILTER
VCO
MS = LOW
FREQUENCY DIVIDER 1 : 2
PHASE DETECTOR
FREQUENCY DIVIDER 1 : 2
DELAY
7
LLCA
10
LLCB
14
LLC2A
20
LLC2B
15
CREF
LFCO
11
PRE-FILTER AND PULSE SHAPER
POWER-ON RESET
12
RESN
LFCO2
19
CE
2
16
3
4
6, 9, 13, 18
LFCOSEL
PORD
V_{SSA}
V_{SSD}
MEH061

05/92-PRELIMINARY

SAA7191B – Digital Multistandard Color Decoder, Square Pixel (DMSD-SQP)

FEATURES

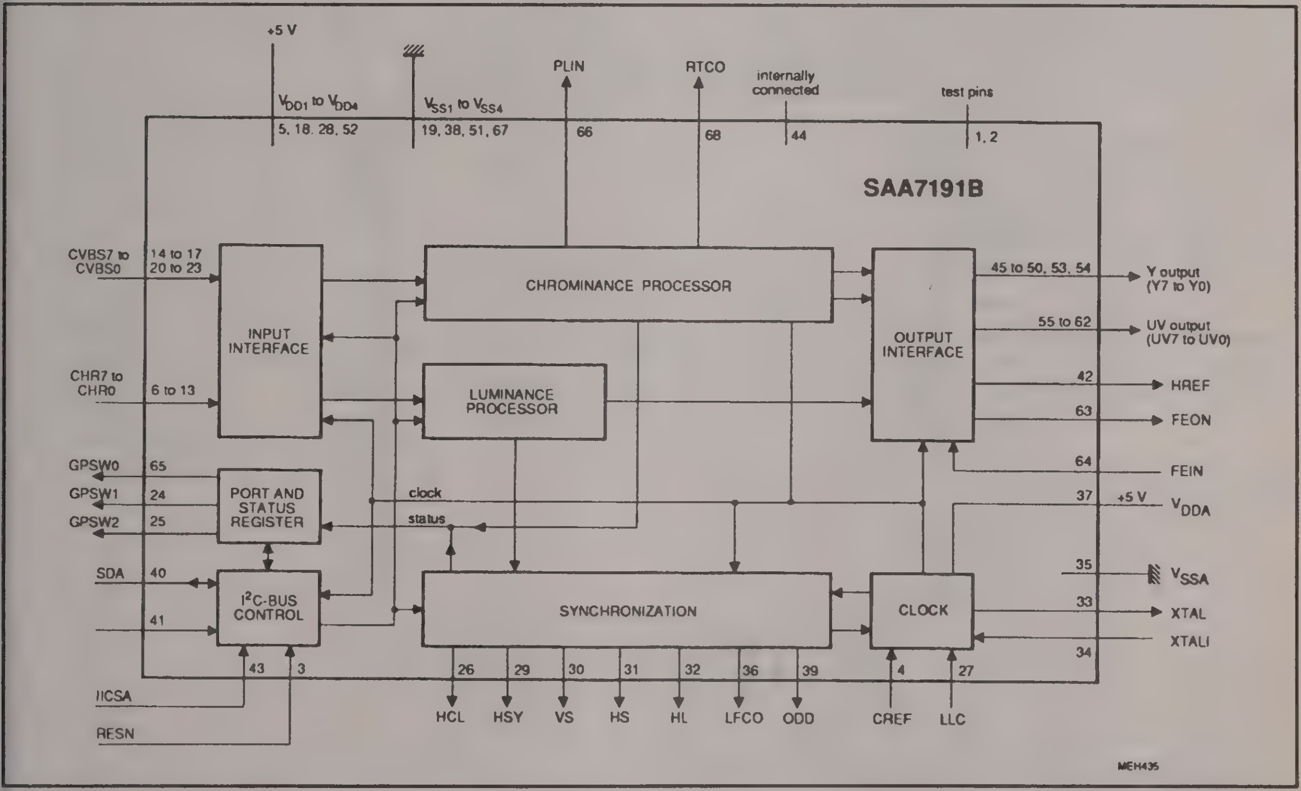
- Separate 8-bit luminance (Y or CVBS) and 8-bit chrominance inputs (CVBS or C) from CVBS, Y/C, S-Video (S-VHS or Hi8) sources
- Luminance and chrominance signal processing for standards PAL-B/G, NTSC-M, SECAM
- Horizontal and vertical sync detection for all standards
- Real-time control output RTC to be used for frequency-locked digital video encoder (SAA7199B). RTCO contains serialized information about actual clock frequency, subcarrier frequency and PAL/SECAM sequence.
- Controls via the I²C-bus
- User programmable aperture correction (horizontal peaking)
- Compatible with memory-based features (line-locked clock)
- Cross-color reduction by chrominance comb-filtering (NTSC) or by special cross color cancellation (SECAM)
- 8-bit quantization of input signals
- 768/640 active samples per line equals 50/60Hz (SQP)
- The YUV bus supports data rates of 780 × f_H equal to 12.2727MHz for 60Hz (NTSC-M) and 944 × f_H equal to 50Hz (PAL-B/G, SECAM) in 4:1:1 or 4:2:2 formats (via the I²C-bus)
- One crystal oscillator of 26.8MHz

GENERAL DESCRIPTION

The SAA7191B is a digital multistandard color decoder suitable for 8-bit CVBS input signals or for 8-bit luminance and 8-bit chrominance input signals (Y/C).

The SAA7191B is down-compatible with SAA7191. The SAA7191B has additional outputs RTCO, GPSW0 and ODD. These new outputs are in high-impedance state when NFEN-bit = 0.

BLOCK DIAGRAM



+5 V
V_{DD1} to V_{DD4}
5, 18, 28, 52
V_{SS1} to V_{SS4}
19, 38, 51, 67
PLIN
66
RTCO
68
internally connected
44
test pins
1, 2
SAA7191B
CVBS7 to CVBS0
14 to 17
20 to 23
INPUT INTERFACE
CHR7 to CHR0
6 to 13
CHROMINANCE PROCESSOR
LUMINANCE PROCESSOR
OUTPUT INTERFACE
45 to 50, 53, 54
Y output (Y7 to Y0)
55 to 62
UV output (UV7 to UV0)
42
HREF
63
FEON
64
FEIN
37
+5 V
V_{DDA}
35
V_{SSA}
33
XTAL
34
XTALI
GPSW0
65
GPSW1
24
GPSW2
25
PORT AND STATUS REGISTER
clock
status
SDA
40
41
I²C-BUS CONTROL
43
3
IICSA
RESN
SYNCHRONIZATION
CLOCK
26
29
30
31
32
36
39
4
27
HCL
HSY
VS
HS
HL
LFCO
ODD
CREF
LLC
MEH435

04/93-PRELIMINARY

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SAA7151B – Digital Multistandard Decoder with SCART Interface (DMSD2-SCART)

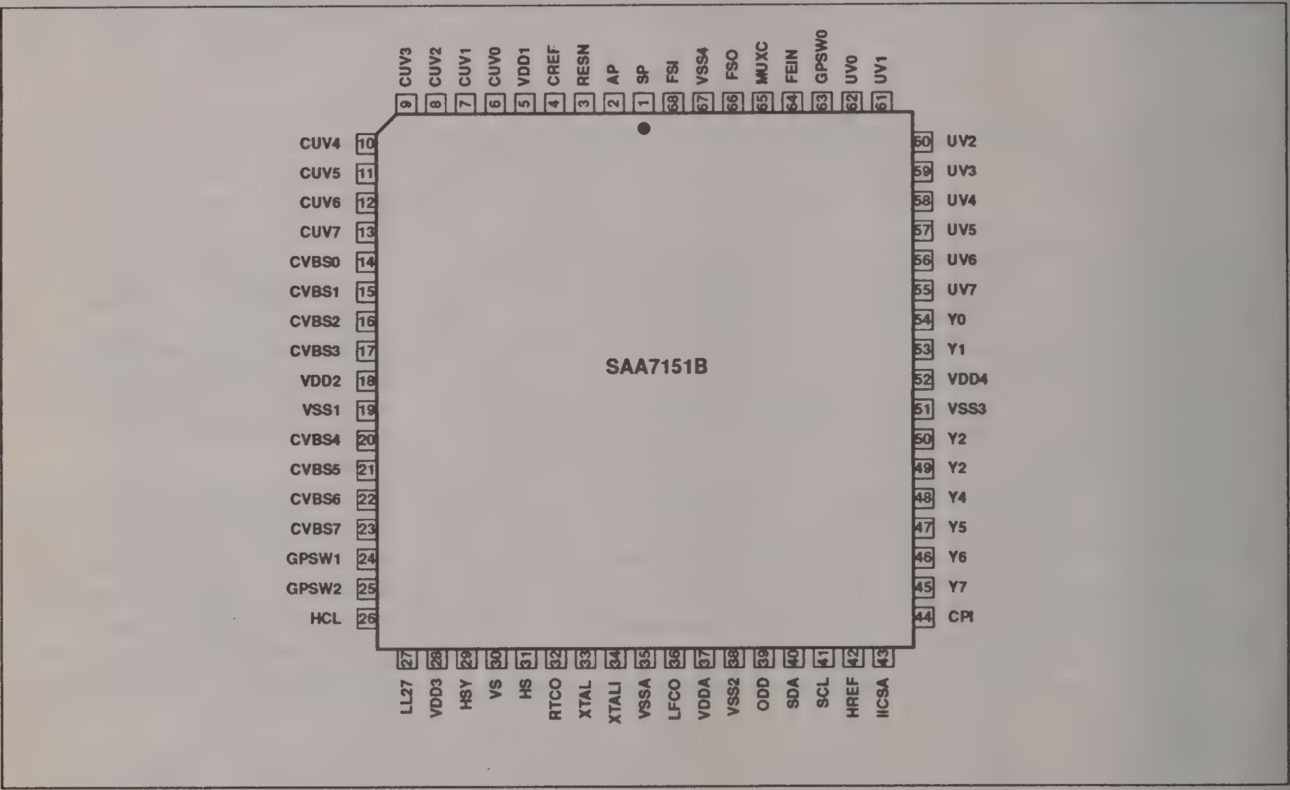
FEATURES

- 8-bit performance on chip for luminance and chrominance signal processing for PAL, NTSC and SECAM standards
- Separate 8-bit luminance and 8-bit chrominance input signals from Y/C, CVBS, S-Video (S-VHS or Hi8) sources
- SCART signal insertion by means of RGB/YUV conversion; fast switch handling
- Horizontal and vertical sync detection for all standards
- Real time control output RTCO
- Fast sync recovery of vertical blanking for VCR signals (bottom flutter compensation)
- Controls via the I²C-bus
- User programmable aperture correction (horizontal peaking)
- Cross-color reduction by chrominance comb-filtering (NTSC) or by special cross-color cancellation (SECAM)
- 8-bit quantization of output signals in 4:1:1 or 4:2:2 formats
- 720 active samples per line
- The YUV bus supports a data rate of 13.5MHz (CCIR 601)
  - (864 × f_H) for 50Hz
  - (858 × f_H) for 60Hz
- Compatible with memory-based features (line-locked clock)
- One 24.576MHz crystal oscillator for all standards

GENERAL DESCRIPTION

The SAA7151B is a digital multistandard color-decoder having two 8-bit input channels, one for CVBS or Y, the other for chrominance or time-multiplexed color-difference signals.

PIN CONFIGURATION


CUV3 9
CUV2 8
CUV1 7
CUV0 6
VDD1 5
CREF 4
RESN 3
AP 2
SP 1
FSI 68
VSS4 67
FSO 66
MUXC 65
FEIN 64
GPSW0 63
UV0 62
UV1 61
CUV4 10
CUV5 11
CUV6 12
CUV7 13
CVBS0 14
CVBS1 15
CVBS2 16
CVBS3 17
VDD2 18
VSS1 19
CVBS4 20
CVBS5 21
CVBS6 22
CVBS7 23
GPSW1 24
GPSW2 25
HCL 26
60 UV2
59 UV3
58 UV4
57 UV5
56 UV6
55 UV7
54 Y0
53 Y1
52 VDD4
51 VSS3
50 Y2
49 Y2
48 Y4
47 Y5
46 Y6
45 Y7
44 CPI
SAA7151B
27 LL27
28 VDD3
29 HSY
30 VS
31 HS
32 RTCO
33 XTAL
34 XTALI
35 VSSA
36 LFCO
37 VDDA
38 VSS2
39 ODD
40 SDA
41 SCL
42 HREF
43 IICSA

04/93-PRELIMINARY

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SAA7194 – Digital Video Decoder and Scaler Circuit (DESC)

FEATURES

- Digital 8-bit luminance input video (Y) or CVBS
- Digital 8-bit chrominance input (CVBS or C from CVBS, Y/C, S-video (S-VHS or Hi8))
- Luminance and chrominance signal processing for main standards PAL, NTSC and SECAM
- Horizontal and vertical sync detection for all standards
- User programmable luminance peaking for aperture correction
- Compatible with memory-based features (line-locked clock, square pixel)
- Cross-color reduction by chrominance comb filtering for NTSC or special cross-color cancellation for SECAM
- UV signal delay lines for PAL to correct chrominance phase errors
- Square-pixel format with 768/640 active samples per line
- The bidirectional Expansion Port (YUV-bus) supports data rates of 780 × f_H (NTSC) and 944 × f_H (PAL, SECAM) in $:2:2 format
- Brightness, contrast, hue and saturation controls for scaled outputs
- Down-scaling of video windows with 1023 active samples per line and 1023 active lines per frame to randomly sized windows
- 2 D data processing for improved signal quality of scaled luminance data, especially for compression applications
- Chroma key (α-generation)
- YUV to RGB conversation including anti-gamma ROM tables for RGB
- 16-word FIFO register for 32-bit output data
- Output configurable for 32/24/16-bit video data bus
- Scaled 16-bit 4:2:2 YUV output
- Scaled 15-bit RGB (5-5-5+α) and 24-bit 8-8-8-α) output
- Scaled 8-bit monochrome output
- Line increment, field sequence (odd/even, interlace/non-interlace), and vertical reset control for easy memory interfacing
- Output of discontinuous data bursts of scaled video data or continuous data output with corresponding qualifier signals
- Real-time status information
- I^{2}C-bus control
- Only one crystal of 26.8MHz

GENERAL DESCRIPTION

The CMOS circuit SAA7194, digital video decoder and scaler (DESC), is a highly integrated circuit for DeskTop Video applications. It combines the functions of a digital multistandard decoder (SAA7191B) and a digital video scaler (SAA7186). The decoder is based on the principle of line-locked clock decoding. It runs at square-pixel frequencies to achieve correct aspect ratio.

Monitor controls are provided to ensure best display. Four data ports are supported: Ports CVBS(7–0) and CHR(7–0) of the input interface are used in Y/C mode to decode digitized luminance and chrominance signals (digitized in two external ADCs). In normal mode, the the CVBS(7–0) input is only used, and only one ADC is necessary.

The 32-bit VRAM output port is interface to the video memory; it outputs the down-scaled video data. Different formats and operation modes are supported by this circuit. The circuit is I^{2}C-bus-controlled. The I^{2}C-bus interface is clocked by LLC to ensure proper control.

The I^{2}C-bus control is divided into two sections:

- subaddress 00h to 1F for the decoder part
- subaddress 20h to 3F for the scaler part

The programming of the subaddresses for the scaler part becomes effective at the first vertical sync pulse VS after a transmission.

04/93-PRELIMINARY

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SAA7199B – Digital Video Encoder, GENLOCK-Capable

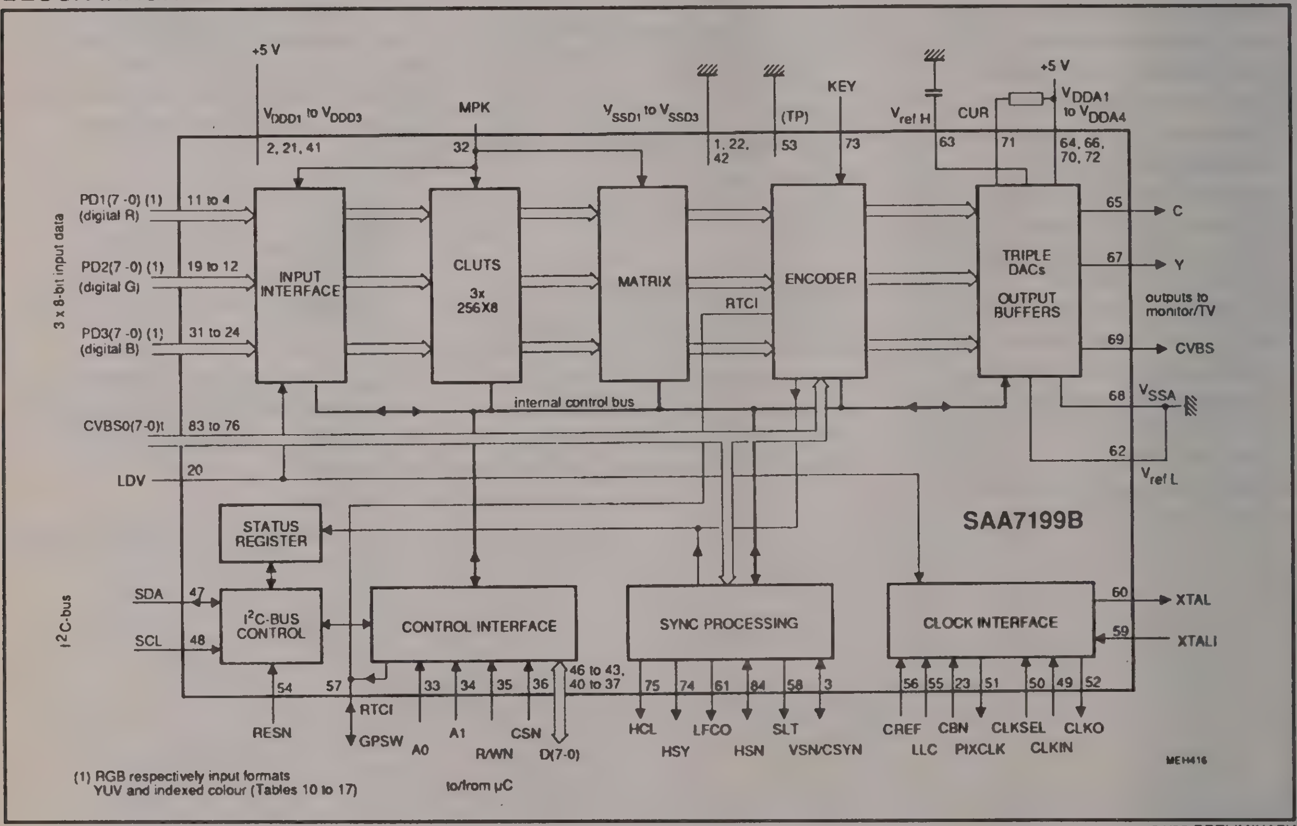
FEATURES

- Monolithic integrated CMOS video encoder circuit
- Standard MPU (12 lines) and I²C-bus interfaces for controls
- Three 8-bit signal inputs PD(7-0) for RGB respectively YUV or indexed color signals
- Square pixel and CCIR input data rates
- Band-limited composite sync pulses
- Three 256X8 color look-up tables (CLUTs) e.g., for gamma-correction
- External subcarrier from a digital decoder (SAA7151B or SAA7191B)
- Multi-purpose key for real-time format switching
- Autonomous internal blanking
- Optional GENLOCK operation with adjustable horizontal sync timing and adjustable subcarrier phase
- Stable GENLOCK operation in VCR standard playback mode
- Optional still video capture extension
- Three suitable video 9-bit digital-to-analog converters
- Composite analog output signals CVBS, Y and C for PAL/NTSC
- "Line 21" data insertion possible

GENERAL DESCRIPTION

The SAA7199B encodes digital base-band color/video data into analog Y, C and CVBS signals (S-Video included). Pixel clock and data are line-locked to the horizontal signal. The circuit can be used i a square pixel or in a consumer TV application. Flexibility is provided by programming facilities via MPU-bus (parallel) or I²C-bus (serial).

BLOCK DIAGRAM



+5 V
V_DDD1 to V_DDD3
2, 21, 41
MPK
32
V_SSD1 to V_SSD3
1, 22, 42
(TP)
53
KEY
73
V_ref H
63
CUR
71
+5 V
V_DDA1 to V_DDA4
64, 66, 70, 72
3 x 8-bit input data
PD1(7 -0) (1) (digital R)
11 to 4
PD2(7 -0) (1) (digital G)
19 to 12
PD3(7 -0) (1) (digital B)
31 to 24
INPUT INTERFACE
CLUTS 3x 256X8
MATRIX
ENCODER
RTCI
TRIPLE DACs OUTPUT BUFFERS
65
C
67
Y
outputs to monitor/TV
69
CVBS
68
V_SSA
62
V_ref L
internal control bus
CVBS0(7-0)
83 to 76
LDV
20
SAA7199B
STATUS REGISTER
I²C-bus
SDA
47
SCL
48
I²C-BUS CONTROL
CONTROL INTERFACE
SYNC PROCESSING
CLOCK INTERFACE
60
XTAL
59
XTALI
54
57
33
34
35
36
46 to 43, 40 to 37
75
74
61
84
58
3
56
55
23
51
50
49
52
RESN
RTCI
GPSW
A0
A1
R/WN
CSN
D(7-0)
HCL
HSY
LFCO
HSN
SLT
VSN/CSYN
CREF
LLC
CBN
PIXCLK
CLKSEL
CLKIN
CLKO
MEH416
(1) RGB respectively input formats YUV and indexed colour (Tables 10 to 17)
to/from µC

04/93-PRELIMINARY

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TDA8703 – 8-Bit High-Speed Analog-to-Digital Converter

FEATURES

- 8-bit resolution
- Sampling rate up to 40MHz
- High signal-to-noise ratio over a large analog input frequency range (7.1 effective bits at 4.43MHz full-scale input)
- Binary or two's complement 3-state TTL outputs
- Overflow/underflow 3-state TTL output
- TTL compatible digital inputs
- Low-level AC clock input signal allowed
- Internal reference voltage generator
- Power dissipation only 290mW (typical)
- Low analog input capacitance, no buffer amplifier required
- No sample-and-hold circuit required

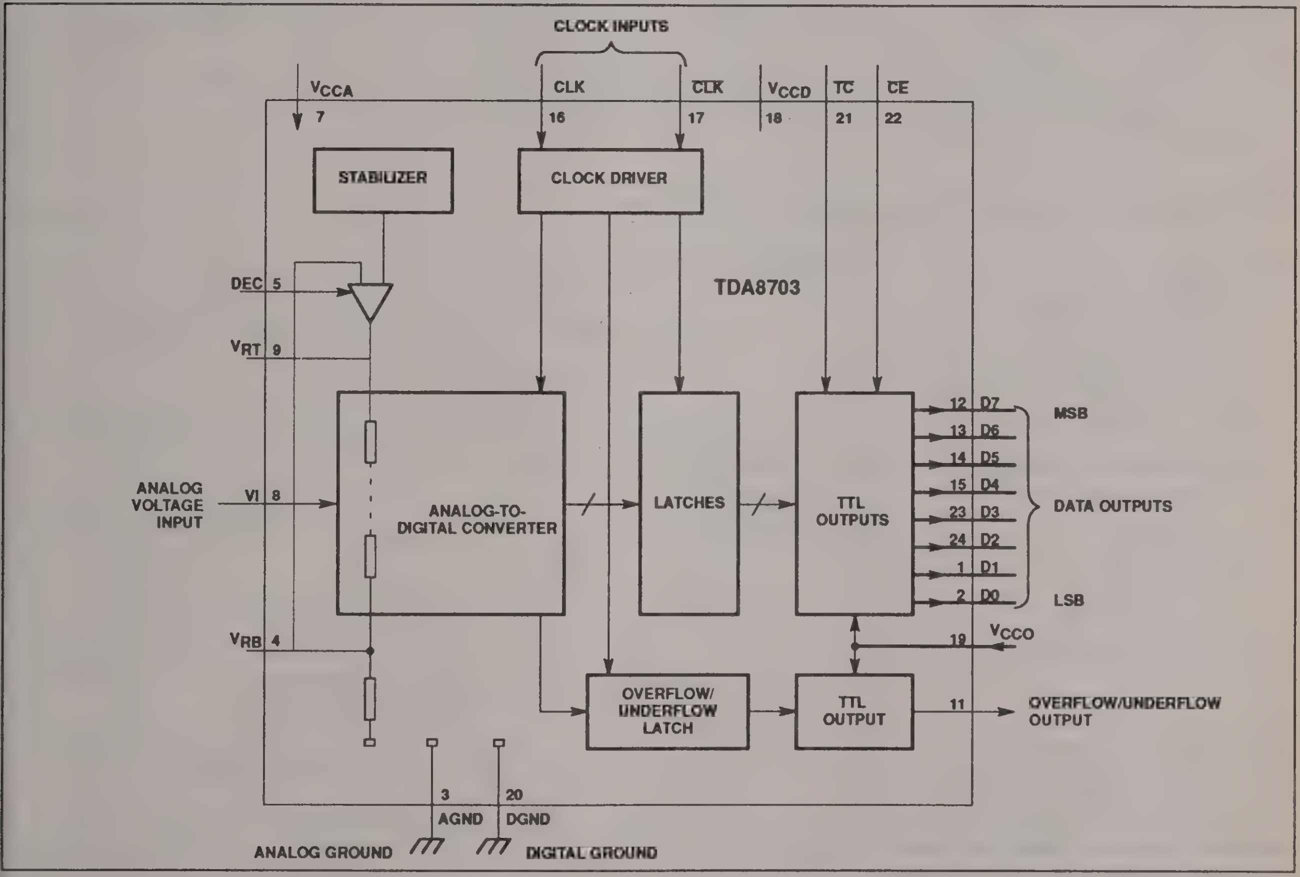
APPLICATIONS

- General purpose high-speed analog-to-digital conversion
- Digital TV, IDTV
- Subscriber TV decoder
- Satellite TV decoders
- Digital VCR

GENERAL DESCRIPTION

The TDA8703 is an 8-bit high-speed analog-to-digital converter (ADC) for video and other applications. It converts the analog input signal into 8-bit binary-coded digital words at a maximum sampling rate of 40MHz. All digital inputs and outputs are TTL compatible, although a low-level AC clock input signal is allowed.

BLOCK DIAGRAM



CLOCK INPUTS
VCCA 7
CLK 16
CLK 17
VCCD 18
TC 21
CE 22
STABILIZER
CLOCK DRIVER
TDA8703
DEC 5
VRT 9
ANALOG VOLTAGE INPUT
VI 8
ANALOG-TO-DIGITAL CONVERTER
LATCHES
TTL OUTPUTS
12 D7
13 D6
14 D5
15 D4
23 D3
24 D2
1 D1
2 D0
MSB
DATA OUTPUTS
LSB
VRB 4
19 VCCO
OVERFLOW/UNDERFLOW LATCH
TTL OUTPUT
11
OVERFLOW/UNDERFLOW OUTPUT
3 AGND
20 DGND
ANALOG GROUND
DIGITAL GROUND

04/93-EHV

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TDA8708A – Video Analog Input Interface

FEATURES

- 8-bit resolution
- Sampling rate up to 32MHz
- Binary or two's complement 3-state TTL outputs
- TTL-compatible digital inputs and outputs
- Internal reference voltage regulator
- Power dissipation of 365mW (typical)
- Input selector circuit (one out of three video inputs)
- Clamp and Automatic Gain Control (AGC) functions for CVBS and Y signals
- No sample-and-hold circuit required

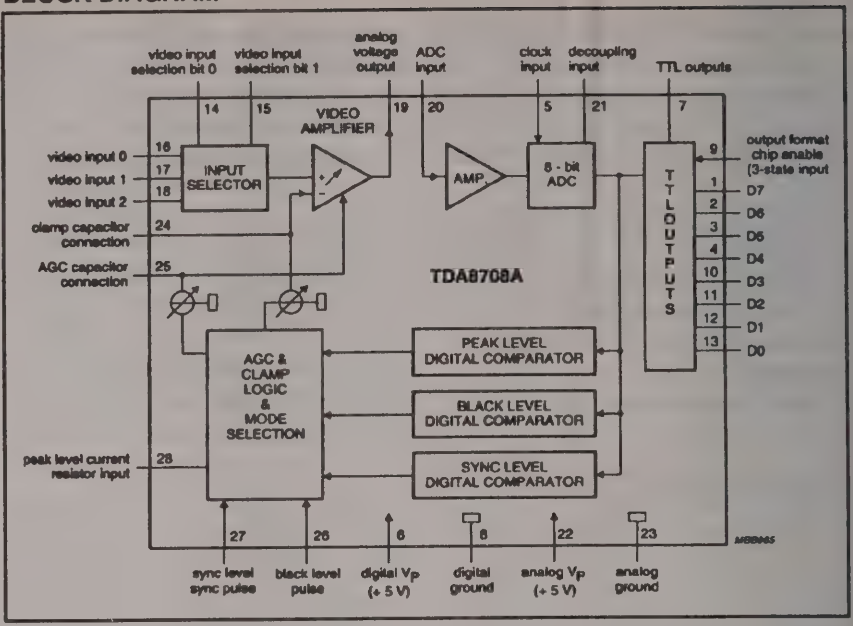
APPLICATIONS

- Video signal decoding
- Scrambled TV (encoding and decoding)
- Digital picture processing
- Frame grabbing

GENERAL DESCRIPTION

The TDA8708A is an analog input interface for video signal processing. It includes a video amplifier with clamp and gain control, an 8-bit analog-to-digital converter (ADC) with a sampling rate of 32MHz and an input selector.

BLOCK DIAGRAM


video input selection bit 0
video input selection bit 1
analog voltage output
ADC input
clock input
decoupling input
TTL outputs
14
15
VIDEO AMPLIFIER
19
20
5
21
7
video input 0
video input 1
video input 2
16
17
18
INPUT SELECTOR
AMP.
8 - bit ADC
TTL OUTPUTS
9
output format chip enable (3-state input
1
2
3
4
10
11
12
13
D7
D6
D5
D4
D3
D2
D1
D0
clamp capacitor connection
24
AGC capacitor connection
25
TDA8708A
AGC & CLAMP LOGIC & MODE SELECTION
PEAK LEVEL DIGITAL COMPARATOR
BLACK LEVEL DIGITAL COMPARATOR
SYNC LEVEL DIGITAL COMPARATOR
peak level current resistor input
28
27
26
6
8
22
23
MBB965
sync level sync pulse
black level pulse
digital V_P (+ 5 V)
digital ground
analog V_P (+ 5 V)
analog ground

04/93-EHV

TDA8709A – Video Analog Input Interface

FEATURES

- 8-bit resolution
- Sampling rate up to 32MHz
- TTL-compatible digital inputs and outputs
- Internal reference voltage regulator
- Low level AC clock inputs and outputs
- Clamp function with selection for '16' or '128'
- No sample-and-hold circuit required
- Three selectable video inputs

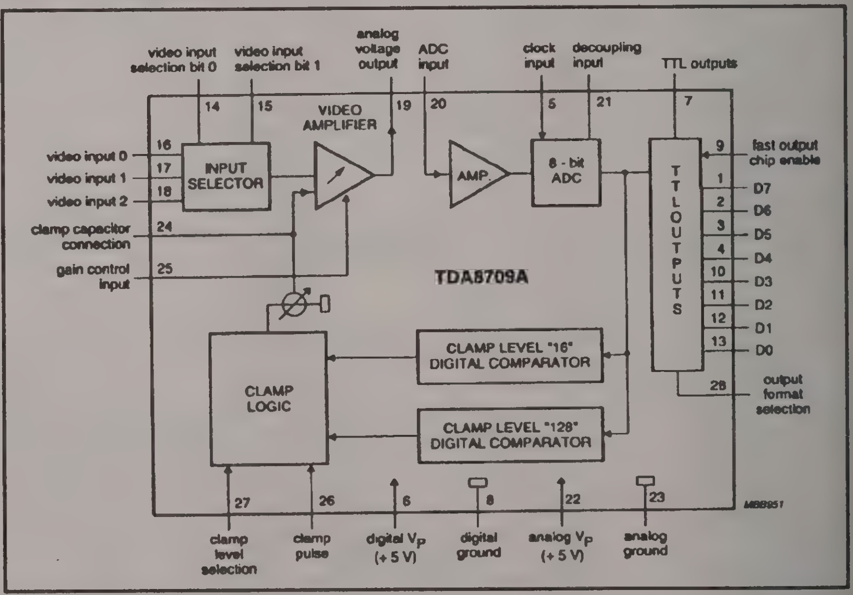
APPLICATIONS

- Video signal decoding
- Digital picture processing
- Frame grabbing
- Color difference signals (U, V)
- R, G, B signals
- Chrominance signal (C)

GENERAL DESCRIPTION

The TDA8709A is an analog input interface for video signal processing. It includes an input selector (1 out of 3 video signals), video amplifier with clamp and external gain control, an 8-bit analog-to-digital converter (ADC) with a sampling rate of 32MHz and an input selector.

BLOCK DIAGRAM


video input selection bit 0
video input selection bit 1
analog voltage output
ADC input
clock input
decoupling input
TTL outputs
14
15
VIDEO AMPLIFIER
19
20
5
21
7
video input 0
video input 1
video input 2
16
17
18
INPUT SELECTOR
AMP.
8 - bit ADC
TTL OUTPUTS
9
fast output chip enable
1
2
3
4
10
11
12
13
D7
D6
D5
D4
D3
D2
D1
D0
clamp capacitor connection
24
gain control input
25
TDA8709A
CLAMP LOGIC
CLAMP LEVEL "16" DIGITAL COMPARATOR
CLAMP LEVEL "128" DIGITAL COMPARATOR
28
output format selection
27
26
6
8
22
23
MBB951
clamp level selection
clamp pulse
digital V_P (+ 5 V)
digital ground
analog V_P (+ 5 V)
analog ground

04/93–EHV

Philips Semiconductors

PHILIPS

TDA8714 – 8-Bit High-Speed Analog-to-Digital Converter

FEATURES

- 8-bit resolution
- Sampling rate up to 75MHz
- High signal-to-noise ratio over a large analog input frequency range (7.6 effective bits at 4.43MHz full-scale input at a 75MHz clock frequency
- Overflow/underflow 3-state TTL output
- TTL compatible digital inputs
- Low-level AC clock input signal allowed
- External reference voltage generator
- Power dissipation only 325mW (typical)
- Low analog input capacitance, no buffer amplifier required
- No sample-and-hold circuit required

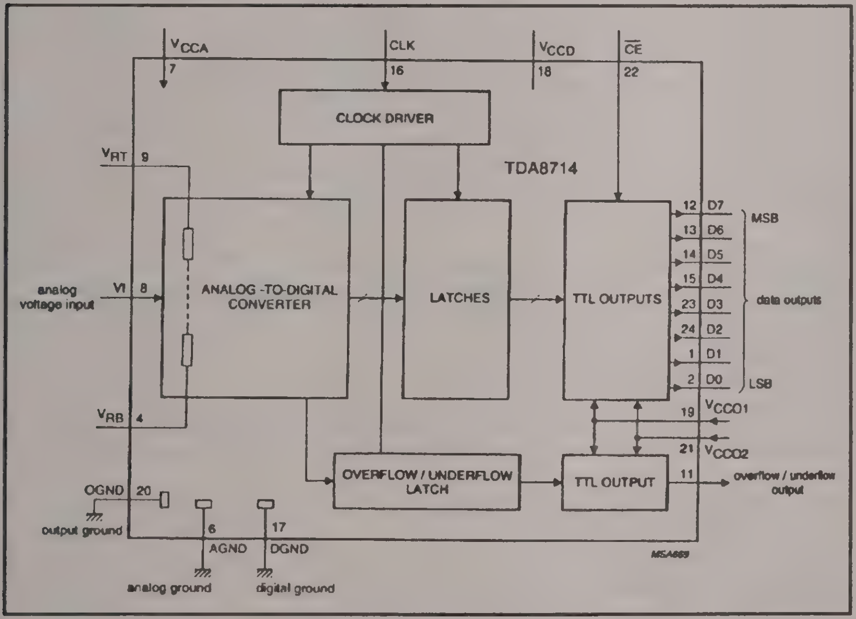
APPLICATIONS

- High-speed analog-to-digital conversion for:
  - – video data digitizing
  - – radar pulse analysis
  - – transient signal analysis
  - – high energy physics research
  - – ΣΔ modulators
  - – medical imaging

DESCRIPTION

The TDA8714 is an 8-bit high-speed analog-to-digital converter (ADC) for professional video and other applications. It converts the analog input signal into 8-bit binary-coded digital words at a maximum sampling rate of 75MHz. All digital inputs and outputs are TTL compatible, although a low-level sine wave clock input signal is allowed.

BLOCK DIAGRAM



V_{CCA}
7
CLK
16
V_{CCD}
18
$\overline{CE}$
22
CLOCK DRIVER
TDA8714
V_{RT}
9
analog voltage input
VI
8
ANALOG -TO-DIGITAL CONVERTER
LATCHES
TTL OUTPUTS
12 D7
13 D6
14 D5
15 D4
23 D3
24 D2
1 D1
2 D0
MSB
data outputs
LSB
19 V_{CCO1}
21 V_{CCO2}
V_{RB}
4
OVERFLOW / UNDERFLOW LATCH
TTL OUTPUT
11
overflow / underflow output
OGND
20
output ground
6
AGND
17
DGND
analog ground
digital ground
MSA669

04/93–PRELIM

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TDA7050(T) – 150mW BTL or 2 x 75mW Low-Voltage Amplifier

DESCRIPTION

This low–voltage amplifier is for small mono (BTL) or stereo apparatus with headphones.

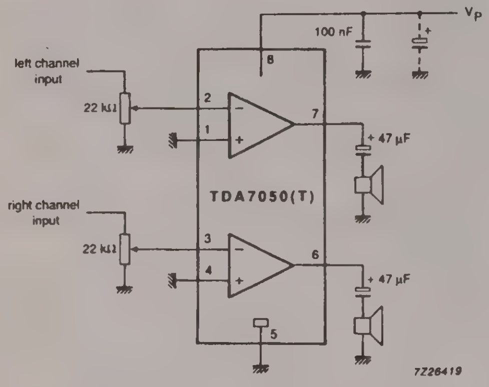
It's in an 8–pin plastic DIL package (TDA7050) or in an 8–pin small outline (SO) plastic package for surface mounting (TDA7050T).

Power output at d_{tot} = 10%		
POWER OUTPUT (W)	SUPPLY VOLTAGE (V)	LOAD IMPEDANCE (Ω)
Mono BTL		
0.15	4.5	64
0.14	3	32
Stereo		
2 x 0.075	4.5	32
2 x 0.035	3	32

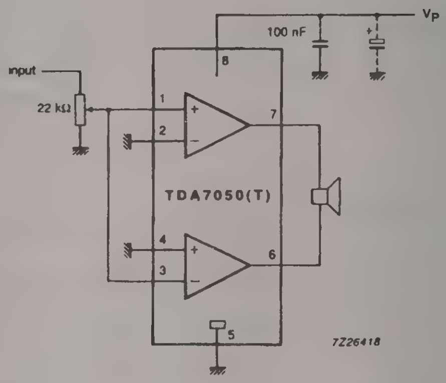
FEATURES

- Requires no external components in BTL configuration
- Operates with battery supplies from 6V down to 1.6V
- Very low quiescent current (typically 3.2mA with 3V supply)
- Closed-loop voltage gain fixed at 26dB in the stereo configuration or 32dB in the BTL configuration (floating differential input, 3V supply and 32Ω load)

BLOCK DIAGRAM


left channel input
right channel input
22 kΩ
22 kΩ
100 nF
Vp
8
2
1
7
3
4
6
5
+ 47 µF
+ 47 µF
TDA7050(T)
7Z26419

TDA7050(T) in single-ended stereo configuration


input
22 kΩ
100 nF
Vp
8
1
2
7
4
3
6
5
TDA7050(T)
7Z26418

TDA7050(T) in single-ended stereo configuration

ARH/0792

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TDA7052/TDA7053 – 1W/2x1W BTL Amplifiers

DESCRIPTION

The proprietary circuit design of these amplifiers makes use of the bridge-tied load (BTL) principle to achieve low-voltage operation without sacrifice of output power. They are therefore primarily intended for battery-powered radios, telephone sets, and portable equipment. Its wide supply voltage range (3V to 18V) makes it suitable for a broad range of applicatons.

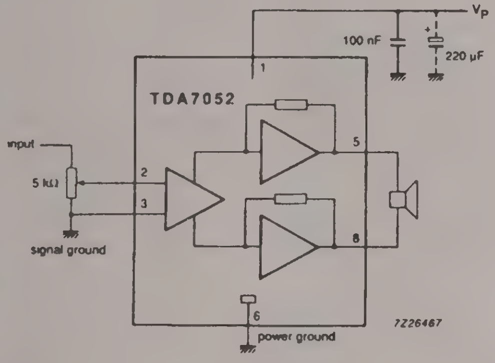
The TDA7052 is in an 8-plastic DIL package and is pin-compatible with half of the TDA7053 which is in a 16-pin plastic DIL package.

Power output at d_{tot} = 10%		
POWER OUTPUT (W)	**SUPPLY VOLTAGE (V)**	**LOAD IMPEDANCE (Ω)**
TDA7052		
1	6	8
2	11	25
TDA7053		
2 x 1	6	8
2 x 2	11	25

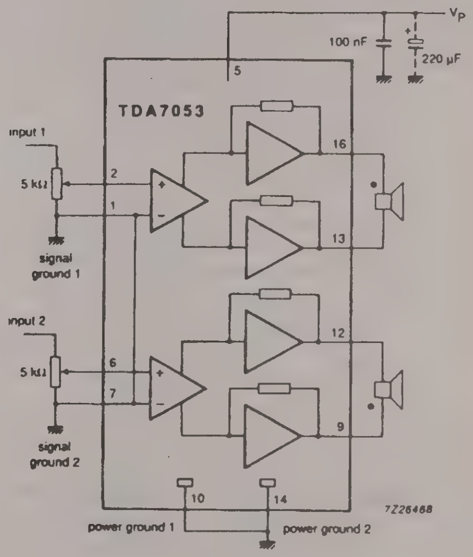
FEATURES

- No external components required
- Excellent overall stability
- No external heatsink required
- Low power consumption
- No switch-on or switch-off clicks
- Supply voltage range 3V to 18V
- Fixed closed–loop voltage gain of 39dB (6V supply, 8Ω lead)

BLOCK DIAGRAM


V_P
100 nF
220 µF
1
TDA7052
input
5 kΩ
2
3
5
8
signal ground
6
power ground
7Z26467

TDA7052 in BTL mono configuration


V_P
100 nF
220 µF
5
TDA7053
input 1
5 kΩ
2
1
16
13
signal ground 1
input 2
5 kΩ
6
7
12
9
signal ground 2
10
14
power ground 1
power ground 2
7Z26468

TDA7053 in BTL stero configuration

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TDA7056A – 3W BTL Amplifier with DC Volume Control

DESCRIPTION

This BTL amplifier is primarily intended for battery-powered portables. However their wide supply voltage range (4.5V to 18V) also makes them suitable for AC powered applications such as monitors and computers.

The amplifier has a built-in DC volume control with a logarithmic characteristic providing control over a range of more than 80dB. When the DC control voltage drops below O.3V, the amplifier is muted. Except for pin 5 (DC volume control), the amplifier is pin-compatible with the TDA7056.

The TDA7056A is in a 9-pin medium-power plastic SIL package.

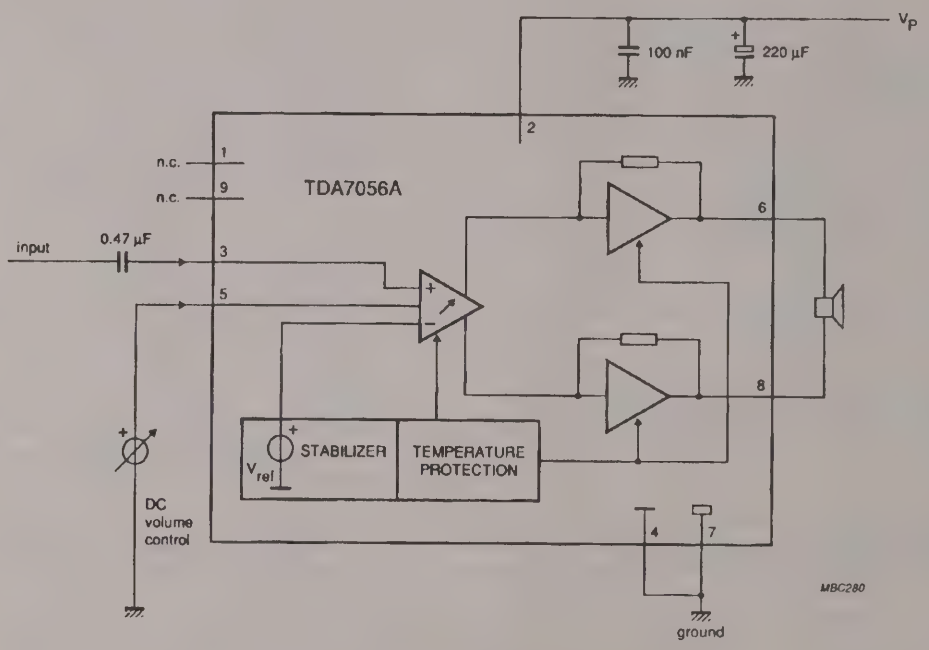
Power output at $d_{tot} = 10\%$

POWER OUTPUT (W)	SUPPLY VOLTAGE (V)	LOAD IMPEDANCE (Ω)
3.4	12	16

FEATURES

- No external components required
- Excellent overall stability
- Output protected against short-circuit to V_{CC}, ground, across load
- Low power consumption
- No switch-on/switch-off clicks
- Supply voltage range 4.5V to 18V
- Incorporates DC volume control with a control range >80dB

BLOCK DIAGRAM



V_P
100 nF
220 µF
2
n.c.
1
n.c.
9
TDA7056A
input
0.47 µF
3
5
6
8
STABILIZER
V_ref
TEMPERATURE PROTECTION
DC volume control
4
7
ground
MBC280

TDA7056A

ARH/0792

TDA7056/TDA7057Q – 3W/2x3 BTL Amplifiers

DESCRIPTION

These BTL amplifiers are primarily intended for battery-powered portables. However their wide supply voltage range (3V to 18V) also makes them suitable for AC powered applications such as monitors and computers.

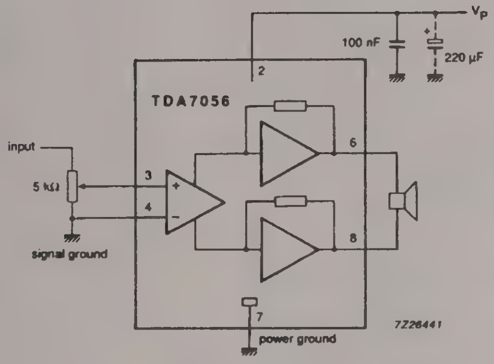
The TDA7056 is in a 9-pin power plastic SIL package. The TDA7057Q is in a 13-pin plastic SIL package with the pins bent to DIL format.

Power output at $d_{tot} = 10\%$		
POWER OUTPUT (W)	**SUPPLY VOLTAGE (V)**	**LOAD IMPEDANCE (Ω)**
TDA7056		
3	11	16
TDA7057Q		
2 x 3	11	16

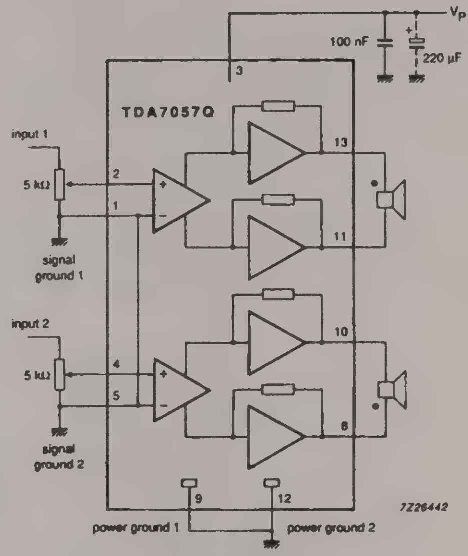
FEATURES

- No external components required
- Excellent overall stability
- Low power consumption
- No switch-on/switch-off clicks
- Supply voltage range 3V to 18V
- Fixed closed-loop voltage gain of 39dB (11V supply, 16Ω lead)

BLOCK DIAGRAM


V_P
100 nF
220 µF
2
TDA7056
input
5 kΩ
3
4
6
8
signal ground
7
power ground
7Z26441

TDA7056 in BTL configuration


V_P
100 nF
220 µF
3
TDA7057Q
input 1
5 kΩ
2
1
13
11
signal ground 1
input 2
5 kΩ
4
5
10
8
signal ground 2
9
12
power ground 1
power ground 2
7Z26442

TDA7057Q in BTL stero configuration

ARH/0792

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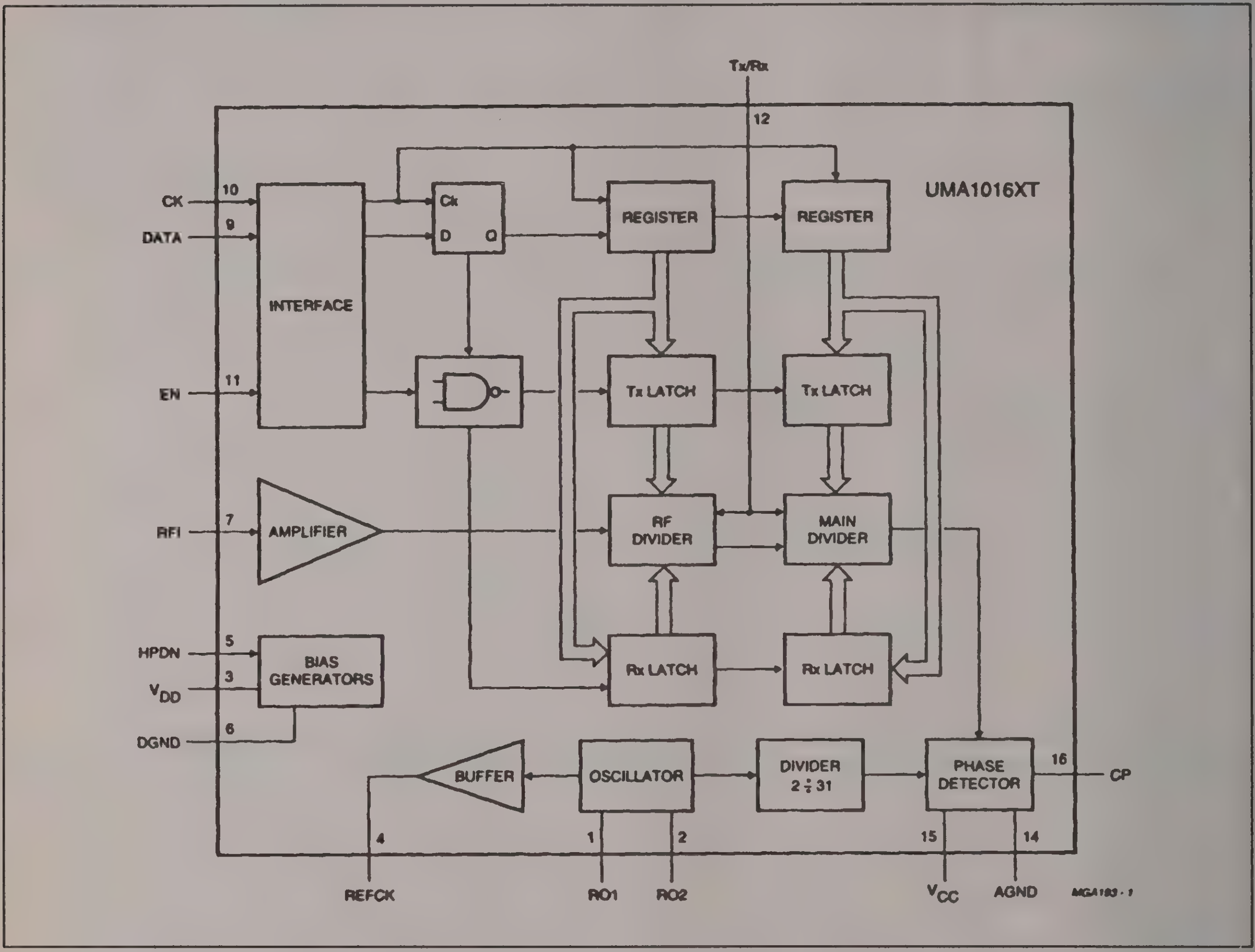
UMA1016xT – Frequency Synthesizer for Radio Communication Equipment

DESCRIPTION

The UMA1016xT is a low power synthesizer for radio communications. Manufactured in bipolar technology, it is designed for a 70 to 1000kHz channel spacing in the 500 to 1000MHz band. The device includes a prescaler, a reference oscillator and dividers, a 3-state phase and frequency comparator, charge pump, and control circuits for the data bus to transfer serial data into the two internal registers. The internal dual register architecture allows a single synthesizer to be used in Fast Frequency Hopping systems without increasing microcontroller overhead. Fast switching between transmit and receive frequencies is achieved without the need for bus overhead. A power-down mode enables the circuit to be idled. The part uses a 3-wire serial bus for programming channels.

BLOCK DIAGRAM


Tx/Rx
12
UMA1016XT
CK
10
DATA
9
INTERFACE
Ck
D
Q
REGISTER
REGISTER
EN
11
Tx LATCH
Tx LATCH
RFI
7
AMPLIFIER
RF DIVIDER
MAIN DIVIDER
HPDN
5
V_{DD}
3
BIAS GENERATORS
Rx LATCH
Rx LATCH
DGND
6
BUFFER
OSCILLATOR
DIVIDER 2 ÷ 31
PHASE DETECTOR
16
CP
4
1
2
15
14
REFCK
RO1
RO2
V_{CC}
AGND
MGA183 - 1

PRELIM/1092

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UAA2080T – Advanced Pager Receiver

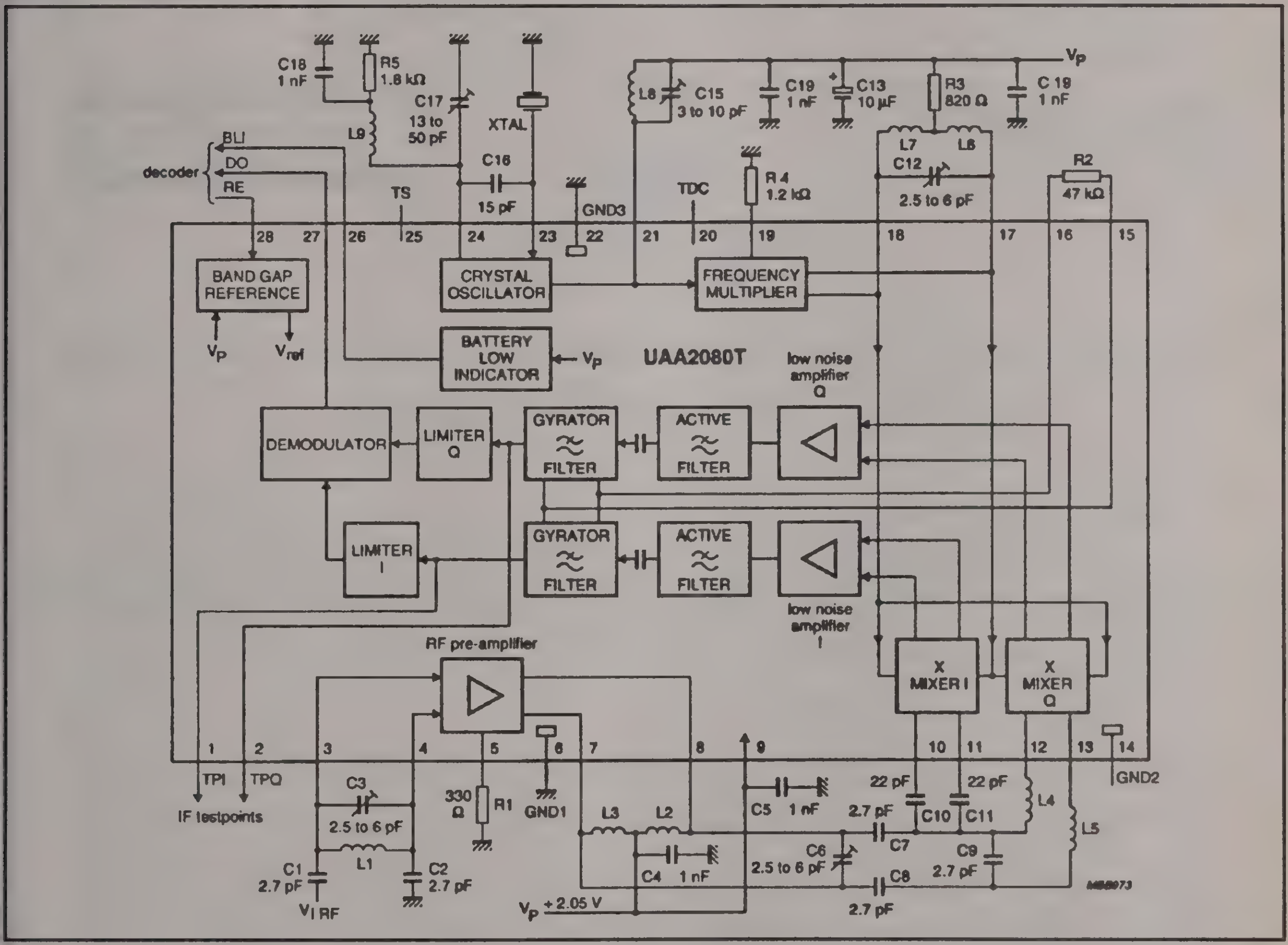
DESCRIPTION

The UAA2080T is a high performance low-power radio receiver circuit, primarily intended for VHF and UHF (25 to 512 MHz) pager receivers for wide area digital paging systems, employing direct FM non-return-to-zero (NRZ) frequency shift keying (FSK). The receiver design is based on the "direct conversion" principle where the input signal is mixed directly down to the baseband by a local oscillator on the signal frequency. Two complete signal paths with signals of 90° phase difference are required to demodulate the signal. The circuit makes extensive use of on-chip capacitors to minimize the number of external components.

FEATURES

- Wide frequency range up to 512MHz
- High sensitivity (-126dBm typ.)
- Electronically adjustable filters on chip
- Wide frequency offset range and wide deviation range
- Fully POCSAG compatible
- Power on/off mode selectable by the chip enable input
- Low supply voltage; low power consumption (2.7mA @ 2V typ.)
- High integration level

BLOCK DIAGRAM


C18
1 nF
R5
1.8 kΩ
C17
13 to
50 pF
XTAL
L9
C16
15 pF
BLI
DO
RE
decoder
TS
GND3
L8
C15
3 to 10 pF
C19
1 nF
C13
10 µF
R3
820 Ω
C 19
1 nF
Vp
L7
L6
C12
2.5 to 6 pF
R 4
1.2 kΩ
TDC
R2
47 kΩ
28
27
26
25
24
23
22
21
20
19
18
17
16
15
BAND GAP
REFERENCE
Vp
Vref
CRYSTAL
OSCILLATOR
FREQUENCY
MULTIPLIER
BATTERY
LOW
INDICATOR
Vp
UAA2080T
low noise
amplifier
Q
DEMODULATOR
LIMITER
Q
GYRATOR
FILTER
ACTIVE
FILTER
LIMITER
I
GYRATOR
FILTER
ACTIVE
FILTER
low noise
amplifier
I
RF pre-amplifier
X
MIXER I
X
MIXER
Q
1
2
3
4
5
6
7
8
9
10
11
12
13
14
TPI
TPQ
IF testpoints
C3
2.5 to 6 pF
330
Ω
R1
GND1
L3
L2
C5
1 nF
22 pF
22 pF
L4
GND2
C1
2.7 pF
L1
C2
2.7 pF
VI RF
C4
1 nF
Vp +2.05 V
C6
2.5 to 6 pF
2.7 pF
C7
C10
C11
C8
2.7 pF
C9
2.7 pF
L5
MBB973

08/92–EHV

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CMOS 8-Bit Microprocessors and Peripherals

Part Number	Type	Description	Speed	Package
R65C02 R65NC02 R65C102 R65C112	Microprocessor	MPU, Internal Clock MPU, Internal Clock MPU, Quad Clock MPU, Slave Processor	1, 2, 3, 4 MHz 1, 2, 3 MHz 1, 2, 3, 4 MHz 1, 2, 3 MHz	40-pin DIP 44-pin PLCC
R65C21	I/O	Peripheral Interface Adapter (PIA) interfaces to two 8-bit bidirectional parallel data ports with four control lines and an interrupt request output on each port.	1, 2, 3, 4 MHz	40-pin DIP 44-pin PLCC
R65C22	I/O	Versatile Interface Adapter (VIA) interfaces to two 8-bit bidirectional parallel data ports plus two 16-bit timers and an 8-bit serial port.	1, 2, 3, 4 MHz	40-pin DIP 44-pin PLCC
R65C24	I/O	Peripheral Interface Adapter/Timer (PIAT) interfaces two 8-bit bidirectional parallel data ports and a 16-bit Counter/Timer.	1, 2, 3, 4 MHz	40-pin DIP 44-pin PLCC
R65C51	ACIA	Asynchronous Communications Interface Adapter (ACIA) with on-board baud generator interfaces an asynchronous channel with 5-8 data bits; 1 or 2 stop bits; and odd, even, or no parity; at 1 of 15 selectable rates (to 38,000 baud) or 1/16 external clock rate.	1, 2, MHz	28-pin DIP 28-pin PLCC
R65C52	Dual ACIA	Dual Asynchronous Communications Interface Adapter (DACIA) is a dual channel version of the R65C51 ACIA.	1, 2, 3, 4 MHz	40-pin DIP 44-pin PLCC
R68C552	Dual ACIA	R68C552 DACIA is a 68000 bus-compatible version of the R65C52.	Baud range from 50 to 28,400 bps	40-pin DIP 44-pin PLCC

NMOS 8-Bit Microprocessors and Peripherals

Part Number	Type	Description	Speed	Package
R6502 R6503 R6504 R6505 R6512	Microprocessor	8-bit MPUs	1, 2 MHz 1, 2 MHz 1, 2 MHz 1, 2 MHz 1, 2 MHz	40-pin DIP 28-pin DIP 28-pin DIP 28-pin DIP 40-pin DIP
R6520	I/O	Peripheral Interface Adapter (PIA) interfaces to two 8-bit bidirectional parallel data ports with four control lines and an interrupt request output on each port.	1, 2 MHz	40-pin DIP
R6522	I/O, Timer	Versatile Interface Adapter (VIA) interfaces to two 8-bit bidirectional parallel data ports plus two 16-bit timers and an 8-bit serial port.	1, 2 MHz	40-pin DIP
R6532	RAM, I/O, Timer	RAM-I/O Timer (RIOT) integrates 128 x 8 static RAM, two 8-bit bidirectional data ports, and an interval timer with interrupt.	1 MHz	40-pin DIP
R6545	CRT Controller	CRT Controller (CRTC) controls a CRT raster scan video display at a character clock frequency of 2.5 MHz or 3.7 MHz using 19 registers to program display parameters such as number of rows, number of lines, sync positions and widths, row/column or straight binary addressing selection, and interlaced/non-interlaced scan selection.	2.5, 3.7 MHz	40-pin DIP 44-pin PLCC
R6551	ACIA	Asynchronous Communications Interface Adapter (ACIA) with on-board baud generator interfaces an asynchronous channel with 5-8 data bits; 1 or 2 stop bits; and odd, even, or no parity; at 1 of 15 selectable rates (to 38,000 baud) or 1/16 external clock rate.	1, 2 MHz	28-pin DIP

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R6500 Family of CMOS and NMOS Microcontrollers

R6500 8-bit Microcontroller Product Features

Features		R6500/1	R6500/11	R6500/12	R6500/13	R6500/15	R65C10
Instruction Speed		1000 ns	1000 ns	1000 ns	1000 ns	1000 ns	1000 ns
Max Internal Clock Speed		2MHz	2MHz	2MHz	2MHz	2MHz	2MHz
ROM (x8)		2K	3K	3K	256	4K	2K
RAM (x8)		64	192	192	192	192	64
I/O Lines		32	32	56	32	32	32
Serial Communications		–	USART	USART	USART	USART	USART
16-bit Counters		1	2	2	2	2	1
Expansion Bus		–	16K	16K	65K	16K	–
Interrupts	External	5	6	6	6	6	5
	Internal	1	4	4	4	4	1
OperaPower (mW typ)		750	800	800	800	800	40
Standby Power (mW typ)		35*	12*	12*	12*	12*	4†
Packaging Options		44 PLCC 40 DIP	44 PLCC 40 DIP	68 PLCC 64 QUIP	68 PLCC 64 QUIP	44 PLCC 40 DIP	44 PLCC 40 DIP

• Standby RAM. † Stop mode.

Enhanced Instruction Set 8-bit Micocontroller Product Features

Features	R65C19	R65C29	R65C2901J	R65C39
Instruction Speed	200 ns	200 ns	200 ns	200 ns
Max Internal Clock Speed	10MHz	10MHz	10MHz	10MHz
ROM (x8)	16K	8K	–	8K
RAM (x8)	512	1K	1K	1K
I/O Lines	44	40	40	40
Serial Communications	USART	USART	USART	USART
DMA Access	–	–	–	Yes
16-bit Counters	2	2	2	2
17-bit Time Generators	2	2	2	2
Host Bus Interface	16450	16450	16450	16450/16550
Expansion Bus	64K	512K	512K	512K
Interrupts	8	8	8	8
Operating Power (mW per MHz typ)	20	15	15	15
Sleep Power (mW per MHz typ)	3.5 IDLE	1.8	1.8	1.1
Stop Power (mW typ)	0.6	–	–	–
Packaging Options	80 PQFP 68 PLCC 64 QUIP	80 PQFP 84 PLCC	84 PLCC	80 PQFP 84 PLCC

ROM-less 8-bit Microcontroller Product Features

Features	R6501Q	R6511Q	R6518
Instruction Speed	1000 ns	1000 ns	1000 ns
Max Internal Clock Speed	2MHz	2MHz	2MHz
RAM (x8)	192	192	192
I/O Lines	32	32	16
Serial Communications	USART	USART	USART
16-bit Counters	2	2	2
Expansion Bus	64K	64K	16K
Interrupts External	6	6	6
Internal	4	4	4
Operating Power (mW typ)	800	800	800
Standby Power (mW typ)	12	12	12
Packaging Options	68 PLCC 64 QUIP	68 PLCC 64 QUIP	44 PLCC 40 DIP

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Memory Products

NV RAMs

Features

- 5-V single power supply. Electrically erasable and programmable ROM
- Three-state outputs
- Store and recall are controlled by a narrow signal width : >200ns (parallel type)
- 10,000 or 100,000 erase/write cycles for EPROM
- Ten-year data retention
- Erroneous store protection: =3.5V
- Wide operating temperature (I type) -40°C to +85°C

Applications

- Constant setting
- Data memory
- Rewritable programs and firmware
- System configuration setting
- System parameter and part No. setting
- Systems status monitor

■ SPECIFICATIONS

Model No.	Memory size (bit)	Composition	Operating voltage (V)	Current consumption		Static RAM operation			Store operation (ms)	Array recall operation (ns)	Package
				Operating (mA) Max.	Standby (µA) Max.	Clock frequency (Hz) Max.	Read cycle time (ns) Min.	Write cycle time (ns) Min.	Store time Max.	Recall cycle time Min.	
S-24H30R/I	64	8 × 8 Serial	5 ± 10%	10	1	1M	–		10	2500	8 DIP/SOP
S-24S30R/I	64	8 × 8 Serial	5 ± 10%	10	1	1M	—	—	10	2500	8 DIP/SOP
S-24H45R/I	256	16 × 16 Serial	5 ± 10%	10	1	1M	-	-	10	2500	8 DIP/SOP
S-24S45R/I	256	16 × 16 Serial	5 ± 10%	10	1	1M	—	—	10	2500	8 DIP/SOP
S-22H10R/I	256	64 × 4 Parallel	5 ± 10%	20/30*1	1		200	200	10	1300	18 DIP/SOP
S-22S10R/I	256	64 × 4 Parallel	5 ± 10%	20/30*3	1	—	200	200	10	1300	18 DIP/SOP
S-22H12R/I	1K	256 × 4 Parallel	5 ± 10%	20/30*2	1	—	200	200	10	1300	18 DIP/SOP
S-22S12R/I	1K	256 × 4 Parallel	5 ± 10%	20/30*4	1	—	200	200	10	1300	18 DIP/SOP

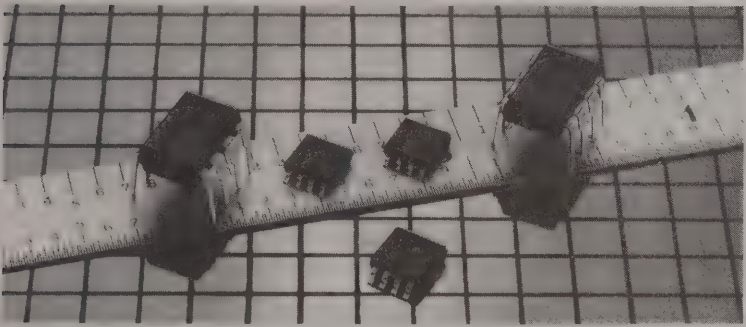
Note) H type All inputs/outputs are compatible with TTL and can be connected directly to TTL.
S type Schmitt inputs are available to Store and Recall terminals.

*1 S-22H10R : 20. S-22H10I : 30 *2 S-22H12R : 20. S-22H12I : 30
*3 S-22S10R : 20. S-22S10I : 30 *4 S-22S12R : 20. S-22S12I : 30

EEPROMs

Features

☐ Low current consumption
☐ 5-V single power supply
☐ Write operation with built-in timer
☐ Data retention: 10 years
☐ Memory protection (S-2918, S-2961)



NEW PRODUCTS:

HIGH SPEED CMOS LOGIC ("FCT-T")

(Available Now)

- Equivalent to Quality Semiconductor's QSOP products.
- Functionally compatible with 74F series and 74FCT series.
- < 7.5 mw power consumption.* TTL compatible inputs and outputs.* 150 mils x 340 mils surface mount pkg..
- 25 mils pin spacing.

SOT-23 PACKAGE

- Voltage Regulators
- Voltage Detectors

STEP-DOWN REGULATORS

S-812XXPG SERIES - HIGH PRECISION VOLTAGE REGULATORS (Available Now)

- +/- 2.4% accuracy.
- < 1 volt I/O difference maximum
- 1.0 µA power consumption
- 40 mA output current
- Available in .1 volt steps from 1.1 to 6.0 volts.

Seiko Instruments

■ SPECIFICATIONS

Model No.	Memory size (bit)	Configuration	Operating voltage (V)		Current consumption		Clock frequency (MHz) Max.	Address access time (ns) Max.	Package	Note
			Read Min.	Write Min.	Operating (mA) Max.	Standby (µA) Max.				
S-2913AR/I	1K	64 × 16 Serial	1.8	2.7	2.0	1.0	2.0	-	8 DIP/SOP	NS code, sequential
S-2913CR/I	1K	32 × 16 + 32 × 16 Serial	1.8	2.7	2.0	1.0	2.0		8 DIP/SOP	NS code, sequential Memory protection
S-2914AR/I	1K	64 × 16 Serial	1.8	2.7	2.0	1.0	2.0		8 DIP/SOP	NS code, Compatible with NMC93C46(DIP)
S-2914AID	1K	64 × 16 Serial	1.8	2.7	2.0	1.0	2.0		8 SOP	NS code, Compatible with NMC93C46
S-2919AR/I	1K	64 × 16 Serial	1.8	2.7	2.0	1.0	2.0		8 DIP/SOP	Easy interface with serial port
S-2919CR/I	1K	32 × 16 + 32 × 16 Serial	1.8	2.7	2.0	1.0	2.0		8 DIP/SOP	Easy interface with serial port Memory protection
S-2919GR/I	1K	32 × 16 + 32 × 16 Serial	1.8	2.7	2.0	1.0	2.0		8 DIP/SOP	Easy interface with serial port Memory protection, CS active "L"
S-2922AR/I	2K	128 × 16 Serial	1.8	2.7	2.0	1.0	2.0		8 DIP/SOP	NS code, sequential
S-2923CR/I	2K	64 × 16 + 64 × 16 Serial	1.8	2.7	2.0	1.0	2.0		8 DIP/SOP	Conform to NS code, sequential, Memory protection
S-2924AR/I	2K	128 × 16 Serial	1.8	2.7	2.0	1.0	2.0		8 DIP/SOP	Conform to NS code
S-2929AR/I	2K	128 × 16 Serial	1.8	2.7	2.0	1.0	2.0		8 DIP/SOP	Easy interface with serial port
S-2929CR/I	2K	64 × 16 + 64 × 16 Serial	1.8	2.7	2.0	1.0	2.0		8 DIP/SOP	Easy interface with serial port Memory protection
S-2929GR/I	2K	64 × 16 + 64 × 16 Serial	1.8	2.7	2.0	1.0	2.0		8 DIP/SOP	Easy interface with serial port Memory protection, CS active "L"
S-2933CR/I	4K	128 × 16 + 128 × 16 Serial	1.8	2.7	2.0	1.0	2.0		8 DIP/SOP	NS code, sequential Memory protection
S-2934AR/I	4K	256 × 16 Serial	1.8	2.7	2.0	1.0	2.0		8 DIP/SOP	NS code, compatible with NMC93C66(DIP)
S-2939AR/I	4K	256 × 16 Serial	1.8	2.7	2.0	1.0	2.0		8 DIP/SOP	Easy interface with serial port
S-2939CR/I	4K	128 × 16 + 128 × 16 Serial	1.8	2.7	2.0	1.0	2.0		8 DIP/SOP	Easy interface with serial port Memory protection
S-2939GR/I	4K	128 × 16 + 128 × 16 Serial	1.8	2.7	2.0	1.0	2.0		8 DIP/SOP	Easy interface with serial port Memory protection, CS active "L"
S-2940I	128	16 × 8 Serial	2.7	3.8	5.0	1.0	0.15		8 DIP/SOP	Easy interface with serial port
S-2961I	384	39 × 8 + 9 × 8 Serial	2.7	3.8	5.0	1.0	0.15		8 DIP/SOP	Easy interface with serial port Memory protection
S-2980I	768	768 × 1 Bit sequential	2.4	4.5	2.0	20	0.25		8 DIP/SOP	Compatible with MB8541
S-2911R/I	1K	64 × 16, 128 × 8 Serial	4.5	4.5	3.0/4.0	100	0.25		8 DIP	GI code, compatible with ER5911
S-2914R	1K	64 × 16, 128 × 8 Serial	4.5	4.5	3.0	100	0.25	·	8 DIP	NS code, compatible with NMC93C46
S-2917I	1K	64 × 16, 128 × 8 Serial	4.5	4.5	4.0	100	0.50		8 DIP/SOP	Easy interface with serial port
S-2918I	1K	32 × 8 + 96 × 8 Serial	4.5	4.5	4.0	100	0.50		8 DIP/SOP	Easy interface with serial port Memory protection
S-2840A(R)	16K	2K × 8 Parallel	4.5	4.5	25	100		200	24 DIP	Compatible with INTEL2816
*S-28F512R	512K	64K × 8 Parallel	4.5	4.5	30	100		150/200	32 DIP/SOP	Compatible with INTEL 28F512 (Vpp = 12V)

* Under development

Linear IC's

SII
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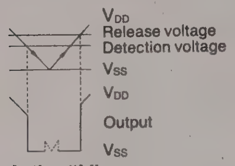
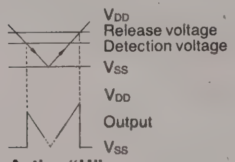
VOLTAGE DETECTORS
(S-807 SERIES)

Operation Timing Chart



Active "L"



Active "H"

Additional models/detection voltages are available– contact Seiko Instruments for details.

■ SELECTION GUIDE AND SPECIFICATIONS

Model No.		Detection voltage (V)	Hysteresis width (V)	Output state	Current consumption (µA) Typ.	Output current(V_{DS}=0.5V) Nch Typ.		Pch Min.		Operating voltage (V)
TO-92	SOT-89*					I_{OUT} (mA)	V_{DD} (V)	I_{OUT} (mA)	V_{DD} (V)	
S-80718AL	S-80718AL-AF-X	1.8V±2.4%	0.09	CMOS output (Low)	1.4 (V_{DD}=3.0V)	0.50	1.2	0.36	4.8	1.0~15.0
S-80719AL	S-80719AL-AG-X	1.9V±2.4%	0.095							
S-80721AL	S-80721AL-AJ-X	2.1V±2.4%	0.105							
—	S-80723AL-AL-X	2.3V±2.4%	0.115							
S-80725AL	S-80725AL-AN-X	2.5V±2.4%	0.125		1.3 (V_{DD}=4.5V)	0.50	1.2	0.36	4.8	
S-80730AL	S-80730AL-AT-X	3.0V±2.4%	0.15		1.0 (V_{DD}=4.5V)	0.50 3.70	1.2 2.4	0.36	4.8	
S-80731AL	S-80731AL-AV-X	3.1V±2.4%	0.155							
S-80733AL	S-80733AL-AX-X	3.3V±2.4%	0.165							
S-80734AL	S-80734AL-AY-X	3.4V±2.4%	0.17							
S-80735AL	S-80735AL-AZ-X	3.5V±2.4%	0.175							
S-80740AL	S-80740AL-A4-X	4.0V±2.4%	0.2		1.0 (V_{DD}=6.0V)	0.50 3.70 7.00	1.2 2.4 3.6	0.46	6.0	
S-80741AL	S-80741AL-A5-X	4.1V±2.4%	0.205							
S-80745AL	S-80745AL-A9-X	4.5V±2.4%	0.225							
S-80744HL	S-80744HL-U8-X	4.295~4.605	Release voltage 4.70 max.		2.6 (V_{DD}=6.0V)	0.50 3.70	1.2 2.4	0.36	4.8	
—	S-80720AN-DH-X	2.0V±2.4%	0.1	Nch opendrain	1.4 (V_{DD}=3.0V)	0.50	1.2	—	—	
S-80721AN	S-80721AN-DJ-X	2.1V±2.4%	0.105		1.3 (V_{DD}=4.5V)					
S-80727AN	S-80727AN-DQ-X	2.7V±2.4%	0.135		1.0 (V_{DD}=4.5V)	0.50 3.70	1.2 2.4	—	—	
S-80728AN	S-80728AN-DR-X	2.8V±2.4%	0.14							
S-80730AN	S-80730AN-DT-X	3.0V±2.4%	0.15							
—	S-80732AN-DW-X	3.2V±2.4%	0.16							
S-80733AN	S-80733AN-DX-X	3.3V±2.4%	0.165							
S-80734AN	S-80734AN-DY-X	3.4V±2.4%	0.17							
S-80735AN	S-80735AN-DZ-X	3.5V±2.4%	0.175							
S-80740AN	S-80740AN-D4-X	4.0V±2.4%	0.2		1.0 (V_{DD}=6.0V)	0.50 3.70 7.00	1.2 2.4 3.6	—	—	
S-80741AN	S-80741AN-D5-X	4.1V±2.4%	0.205							
S-80745AN	S-80745AN-D9-X	4.5V±2.4%	0.225							
S-80740AH	S-80740AH-B4-X	4.0V±2.4%	0.2	CMOS output (High)	1.0 (V_{DD}=6.0V)	9.60	6.0	0.03 0.15	1.2 2.4	

*The "-X" after the SOT-89 part-name becomes "-S" when shipped in stick form, and "-T1" or "-T2" when supplied on tape reels.

VOLTAGE REGULATORS

The S-802 and S-812 have are CMOS voltage regulators. Both Series have internally-fixed output voltage. The S-802 Series is a negative voltage regulator and the S-812 is a positive voltage regulator. SOT-89 package available for surface mount.

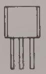
Features

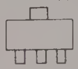
- ☐ Low current consumption
- ☐ Low input/output voltage difference
- ☐ Low temperature coefficient of output voltage (±0.38 mV/°C for the S-81230AG typ.)
- ☐ Wide operating voltage range
- ☐ Good input stability (0.1%/V typ.)

Applications

- ☐ Automobile voltage regulator
- ☐ High stability voltage standard
- ☐ Constant voltage power supply for battery-powered equipment, communications equipment, video equipment, and other equipments which require accurate voltage control

TO-92





SOT-89

Specifications

Model No.	Output Voltage (V)	Output Current (mA) Typ.	Load Stability (mV) Typ.	Input/Output Voltage Difference (mV) Typ.	Current Consumption (µA) Typ.	Input Voltage (V) Max.	Absolute Maximum Rating (V)
S-80230AG	–3±5%	30 (V_{IN} = –5V)	60 (1_{OUT} = 1 to 20 mA)	60 (1_{OUT} = 1 mA)	2.5	–10	–12
S-80250AG	–5±5%	50 (V_{IN} = –7V)	40 (1_{OUT} = 1 to 40 mA)	30 (1_{OUT} = 1 mA)	3.0	–10	–12
S-81211AG	1.1±5%	3 (V_{IN} = 1.5V)	100 (1_{OUT} = 40 to 500 µA)	250	2.2	10	12
S-81225AG	2.5±5%	25 (V_{IN} = 4.5V)	80 (1_{OUT} = 1 to 10 mA)	100	2.5	10	12
S-81230AG	3±5%	30 (V_{IN} = 5V)	60 (1_{OUT} = 1 to 20 mA)	60 (1_{OUT} = 1 mA)	2.5	10	12
S-81250AG	5±5%	50 (V_{IN} = 7V)	40 (1_{OUT} = 1 to 40 mA)	30 (1_{OUT} = 1 mA)	3.0	10	12
S-81250HG	5±5%	50 (V_{IN} = 7V)	40 (1_{OUT} = 1 to 40 mA)	30 (1_{OUT} = 1 mA)	3.0	12	18
S-81350AG	5±5%	40 (V_{IN} = 5.2V)	80 (1_{OUT} = 1 to 60 mA)	200 (1_{OUT} = 40 mA)	25	8	10

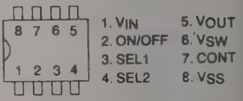
VOLTAGE REGULATOR WITH DC-DC CONVERTER

S-8430AF is a high-precision DC-DC converter consisting of a CR oscillating circuit, a switching regulator, a series regulator and a Schottky-diode. The S-8430AF serves as a series regulator when the input voltage is higher than the output voltage. On the other hand, it serves as a step-up switching regulator and as a series regulator when the input voltage is lower than the output voltage. Therefore, the output level is kept constant. The output voltage can be changed from 3V to 5V, and vice versa by an external signal. The S-8430AF is provided with a standby function that stops an internal CR oscillating circuit by a remote external signal.

Features

- ☐ Low current consumption
  Operating: 11µA typ.
  Standby: 0.2µA max.
- ☐ High-precision output voltage 3.0V ±5%, 5.0V ±4%
- ☐ Low voltage operation 0.9V min.
- ☐ Selectable output voltage (switchable from 3V to 5V, and vice versa)
- ☐ Standby function

Pin Arrangement
8-pin SOP



REALTIME CLOCK

The S-3520CF is a realtime clock that inputs/outputs serial clock and calendar data into/from CPU. A built-in voltage regulator provides good frequency stability and low power consumption. Even during backup operation, the S-3520CF is effective in extending the battery service life. Because it has a built-in 120-bit SRAM, it is also useful for CPU data backup.

FEATURES

- Low Current Consumpton
- Wide data retention voltage range
- Clock and calendar data correction with the increment method
- Built-in auto-calendar until the year 2099
- Built-in 30 x 4-bit SRAM
- Easy serial interface to CPU with 5 lines

Model No.	Operating voltage range (V)	Current consumption (µA) Typ. VDD=5.0V	Data retention voltage (V)	Oscillation frequency deviation (ppm) (Spread between ICs)	Voltage deviation of oscillating frequency (ppm) VDO +2.0 to 6.0V	Package
S-3520 CF	3.0 to 6.0	2.0	2.0 to 6.0	-15 to +15	-5 to +5	14 SOP

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Since its founding in 1912, Sharp Corporation has constantly explored new fields, achieving many 'firsts' in Japan and the world. These include the 'Ever-Sharp' mechanical pencil, from which the company derives its name and trademark; radios; televisions; microwave ovens; solar cells; and electronic organizers. Sharp was the first firm in the world to develop and manufacture electronic calculators; the first to mass-produce LCDs; and, in 1988, the first to develop the 14-inch thin-film transistor (TFT) color LCD, another product of our energetic drive to open up new technologies and new markets.

Today Sharp products, including semiconductors, are used extensively all over the world. Sharp is a complete semiconductor manufacturer, performing its own process development, circuit design, wafer fabrication, assembly, and test. Sharp is an international company, with its Microelectronic Group headquartered in Camas, Washington.

Sharp's integrated circuits include memory products and digital-signal-processing products. The memory product lineup includes: SRAMs (high speed and low power), Pseudo SRAMs, Mask ROMs, and FIFO memories. The digital-signal-processing product lineup includes: a high-performance DSP chip set consisting of a 24-bit 40 MHz fixed-point digital signal processor, and an address generator that can provide more than 150 memory-address sequences.

Sharp's memory devices are used extensively in personal computers, mainframes, workstations, laptops, and also in the newly emerging 'hand-held' and 'pen-input' computing applications.

Sharp's digital-signal-processing products are used in applications such as radar, sonar, medical electronics, image processing, robotics, spread-spectrum communications, digital video/radio, high-end instrumentation, telecommunications, and audio signal and speech communications.

To keep pace with the rapid changes in society, Sharp will continue to direct its efforts towards understanding the crucial trends of the moment, and by supplying our customers with products that truly meet their needs. In short, contributing towards a better standard of life in this age of expanding technology.

Pseudo SRAMs

	DENSITY	ORGANIZATION	MODEL NUMBER	ACCESS TIMES (ns)						CYCLE TIMES (ns)								PACKAGE					
				50	60	70	80	100	120	70	100	110	130	140	150	160	190	SDIP	DIP	SOP	SOJ	SK-DIP	TSOP
PSEUDO SRAM	256K	32K x 8	LH5P832	☐	☐	☐	☐	☐	▨	☐	☐	☐	☐	☐	☐	☐	▨	☐	28	28	☐	28	☐
	512K	64K x 8	LH5P864	☐	☐	☐	▨	☐	☐	☐	☐	☐	☐	▨	☐	☐	☐	☐	☐	32	☐	☐	☐
	1M	128K x 8	LH5P8128[2]	☐	▨	☐	▨	▨	☐	☐	▨	☐	▨	☐	☐	▨	☐	☐	32	32	☐	☐	32[3]
		128K x 8	LH5P8129[1]	☐	▨	☐	▨	▨	☐	☐	▨	☐	▨	☐	☐	▨	☐	☐	32	32	☐	☐	32[3]

NOTES:
☐ = Not available.
▨ = Operating frequency or access/cycle time parts that are either available now or soon to be available. Contact your Sharp representative for availability.
1. $\overline{\text{CS}}$ Control
2. $\overline{\text{CE}}$ Control
3. TSOP(I)
4. TSOP(II) - Consult factory for availability.

MD-7AA

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Static RAMs

PROCESS		DENSITY	ORGANIZATION	MODEL NUMBER	70	80	100	120	150	200	260	300	500	1000	DIP	SK-DIP	SOP	TSOP	SOJ
					ACCESS TIME (ns)										PACKAGE				
LOW-POWER STATIC RAM	FULL CMOS	1K	256K x 4	LH5101								▨			22				
		4K	1K x 4	LH5114					▨						18				
		16K	2K x 8	LH5116/H			▨								24	24	24		
				LH5116S										▨			24		
				LH5118/H			▨								24	24	24		
		64K	8K x 8	LH5168/H		▨	▨								28	28	28	28	
				LH5168SH									▨				28		
				LH5168ST									▨					28	
				LH5168Z8						▨							28		
				LH5168Z9							▨						28		
		256K	32K x 8	LH51256L			▨	▨							28		28		
	CMOS PERIPHERY	64K	8K x 8	LH5268A			▨								28	28	28		
		256K	32K x 8	LH52B256	▨		▨								28	28	28		

PROCESS		DENSITY	ORGANIZATION	MODEL NUMBER	7	9	10	12	15	17	20	25	35	45	DIP	SK-DIP	SOP	TSOP	SOJ	TQFP
HIGH SPEED STATIC RAM	CMOS PERIPHERY	256K	64K x 4	LH52252A								▨	▨	▨		24			24	
				LH52253							▨	▨	▨			28			28	
			32K x 8	LH52258A							▨	▨				28			28	
		1M	256K x 4	LH521002							▨	▨	▨						28	
			128K x 8	LH521007A							▨	▨	▨						32	
				LH521008							▨	▨	▨						32	
		1.125 M	64K x 18	LH521028							▨	▨	▨						PLCC 52	
			32K x 36	LH52V1036B2		▨	▨	▨		▨										100
				LH52V1036C4	▨		▨	▨	▨											100

NOTES:

☐ = Not available.

▨ = Operating frequency or access/cycle time parts that are either available now or soon to be available. Contact your Sharp representative for availability.

MD-3

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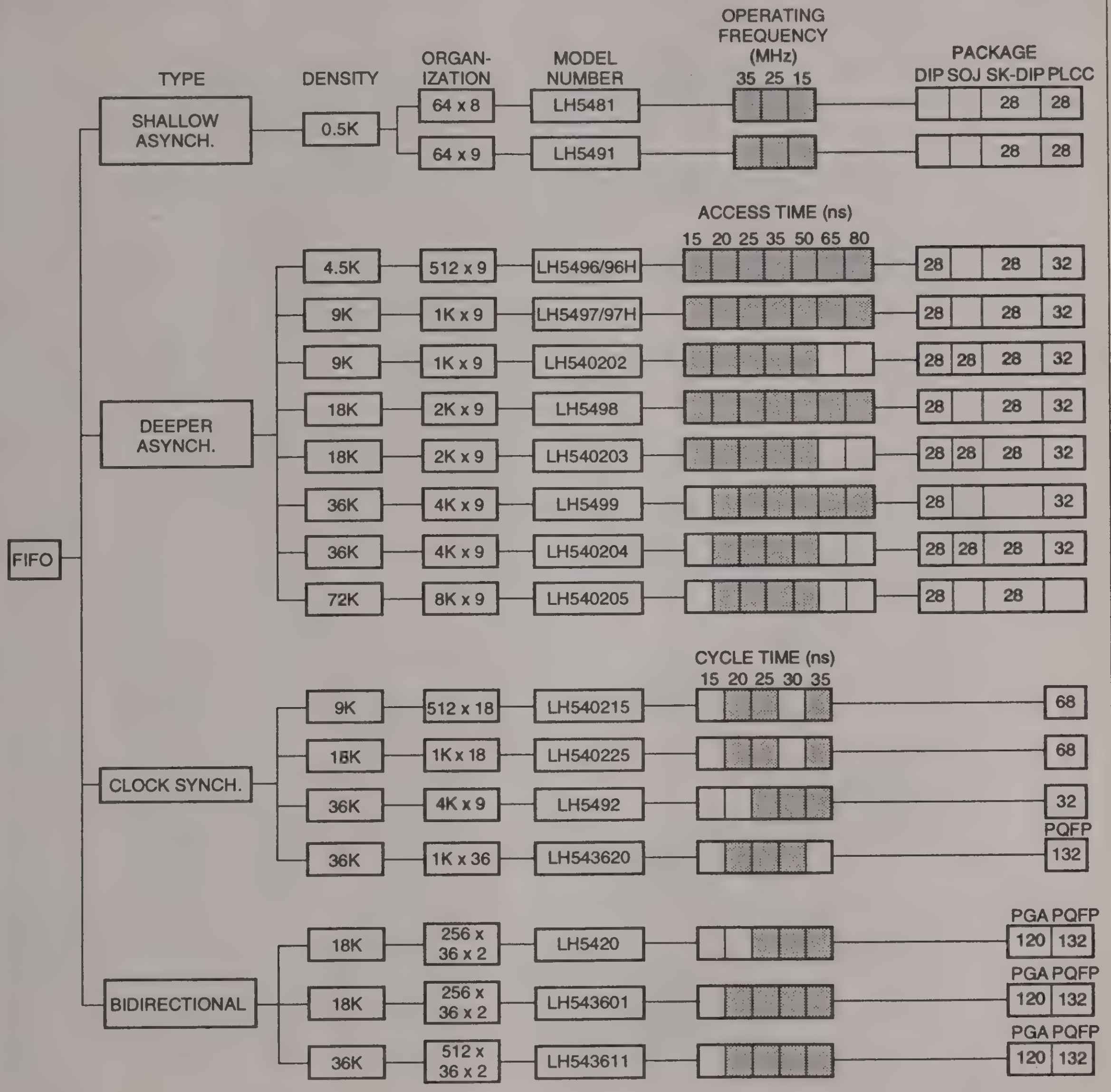
FIFOs



TYPE	DENSITY	ORGANIZATION	MODEL NUMBER	OPERATING FREQUENCY (MHz) 35	25	15	PACKAGE DIP	SOJ	SK-DIP	PLCC
SHALLOW ASYNCH.	0.5K	64 x 8	LH5481	▨	▨	▨			28	28
		64 x 9	LH5491	▨	▨	▨			28	28

TYPE	DENSITY	ORGANIZATION	MODEL NUMBER	ACCESS TIME (ns) 15	20	25	35	50	65	80	PACKAGE DIP	SOJ	SK-DIP	PLCC
DEEPER ASYNCH.	4.5K	512 x 9	LH5496/96H	▨	▨	▨	▨	▨	▨	▨	28		28	32
	9K	1K x 9	LH5497/97H	▨	▨	▨	▨	▨	▨	▨	28		28	32
	9K	1K x 9	LH540202	▨	▨	▨	▨	▨	☐	☐	28	28	28	32
	18K	2K x 9	LH5498	▨	▨	▨	▨	▨	▨	▨	28		28	32
	18K	2K x 9	LH540203	▨	▨	▨	▨	▨	☐	☐	28	28	28	32
	36K	4K x 9	LH5499	☐	▨	▨	▨	▨	▨	▨	28			32
	36K	4K x 9	LH540204	☐	▨	▨	▨	▨	☐	☐	28	28	28	32
	72K	8K x 9	LH540205	☐	▨	▨	▨	▨	☐	☐	28		28	

TYPE	DENSITY	ORGANIZATION	MODEL NUMBER	CYCLE TIME (ns) 15	20	25	30	35	PACKAGE
CLOCK SYNCH.	9K	512 x 18	LH540215	☐	▨	▨	☐	▨	68
	18K	1K x 18	LH540225	☐	▨	▨	☐	▨	68
	36K	4K x 9	LH5492	☐	☐	▨	▨	▨	32
	36K	1K x 36	LH543620	☐	▨	▨	▨	☐	PQFP 132
BIDIRECTIONAL	18K	256 x 36 x 2	LH5420	☐	☐	▨	▨	▨	PGA 120, PQFP 132
	18K	256 x 36 x 2	LH543601	☐	▨	▨	▨	▨	PGA 120, PQFP 132
	36K	512 x 36 x 2	LH543611	☐	▨	▨	▨	▨	PGA 120, PQFP 132

NOTES:

☐ = Contact your Sharp representative for availability.

▨ = Operating frequency or access/cycle time parts which either are available now or are soon to be available. Contact your Sharp representative for availability. Asychronous parts are specified according to access time or operating frequency; synchronous parts are specified according to cycle time.

MD-6

SHARP

SHARP ELECTRONICS CORPORATION

MICROELECTRONICS GROUP
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M/S 20, Camas, WA 98607

Literature: 800-642-0261
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Fax: 206-834-8903

SHARP
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Mask ROMs

MASK ROM

PINOUT	DENSITY	ORGANIZATION	MODEL NUMBER	55	70	80	100	120	150	200	500	DIP	SOP	TSOP	QFP
				ACCESS TIME (ns)								PACKAGE			
JEDEC STANDARD EPROM PINOUT	256K	32K x 8	LH53259						▨			28	28		44[2]
	512K	64K x 8	LH53515						▨			28	28 32		44[2]
	1M	128K x 8	LH530800A						▨			32	32		44[2]
			LH530800A-Y								▨	32	32		44[2]
			LH53H0900	▨								32	32		
	2M	256K x 8	LH532100B					▨	▨			32	32	32[4]	
	4M	512K x 8	LH534100B							▨		32	32		
			LH534K00						▨			32	32	32[4]	
			LH534R00					▨				32	32	32[4]	
			LH53H4100			▨						32	32	32[4]	
	8M	1M x 8	LH538300B						▨			32	32	32[4]	
			LH538R00A					▨				32	32	32[4]	
x 8/x 16 MASK ROM PINOUT	1M	128K x 8	LH531000B						▨			28	28		44[1]
	2M	256K x 8 128K x 16	LH532000B					▨	▨			40	40	48[3]	44[1,2]
			LH532000B-S								▨	40	40	48[3]	44[1,2]
	4M	512K x 8 256K x 16	LH534000B							▨		40	40	48[3]	44[1,2]
			LH534000B-S								▨	40	40	48[3]	44[1,2]
			LH534500A						▨			40	40	48[3]	44[1]
			LH534600A				▨					40	40	48[3]	44[1]
			LH534P00					▨				40	40	48[3]	44[1]
			LH53H4000			▨						40	40	48[3]	
	8M	1M x 8 512K x 16	LH538000-S								▨	42	44	48[3]	64
			LH538500B						▨			42	44	48[3]	44[1] 64
			LH538600				▨					42	44	48[3]	44[1] 64
			LH538P00A					▨				42	44	48[3]	
	16M	2M x 8 1M x 16	LH5316501		▨				▨			42	44		
			LH5316500C						▨			42	44	48[3]	
	32M	4M x 8 2M x 16	LH5332500						▨				44		64

NOTES:

☐ = Not available.

▨ = Operating frequency or access/cycle time parts that are either available now or soon to be available. Contact your Sharp representative for availability.

LH5XXX: CMOS

1. 14 x 14 mm^2 package
2. QFP also available in 10 x 10 mm^2 package
3. TSOP (Type I)
4. TSOP (Type II)

MD-5

SHARP
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SIEMENS

8-Bit Microcontrollers

Siemens Part Number	Clock Frequency	Package Type(s)	Description	Features	
SAB 8031A	12 MHz	PDIP 40 PLCC 44	8-Bit	- Features timer/counters, interrupt controller, serial and parallel ports, with on-chip oscillator - Lower power, increased operating voltage range over SAB 8031	
SAB 8031A-16	16 MHz	PDIP 40 PLCC 44			
SAB 8031A-20	20 MHz	PDIP 40 PLCC 44			
SAB 8051A	12 MHz	PDIP 40 PLCC 44	8-Bit	- An SAB 8031A with 4K of on-chip ROM for program memory	
SAB 8051A-16	16 MHz	PDIP 40 PLCC 44			
SAB 8032B	12 MHz	PDIP 40 PLCC 44	8-Bit	- Enhanced version of SAB 8031A - Additional RAM, timer/counter, interrupt source	
SAB 8032B-16	16 MHz	PDIP 40 PLCC 44			
SAB 8032B-20	20 MHz	PDIP 40			
SAB 8052B	12 MHz	PDIP 40 PLCC 44	8-Bit	- An SAB 8032B with 8K of on-chip ROM for program memory	
SAB 8052B-16	16 MHz	PDIP 40 PLCC 44			
SAB 8052B-20	20 MHz	PDIP 40 PLCC 44			
SAB 80515	12 MHz	PLCC 68	8-Bit	- Enhanced (software compatible) version of the SAB 8051A - 8K ROM, 256 Bytes RAM, 6 ports, 8-Bit A/D converter with programmable reference voltages, three 16-Bit timer/counters, timer/counter register array with PWM capability on 4 channels, 12 interrupt sources, serial interface, watchdog timer	
SAB 80535	12 MHz	PLCC 68	8-Bit	- An SAB 80515 without the 8K of on-chip ROM for program memory	
SAB C501-L	12 MHz 20 MHz 40 MHz	PDIP 40 PLCC 44	8-Bit CMOS	- Same as 80C32, ROMLESS	
SAB C501-R	12 MHz 20 MHz 40 MHz	PDIP 40 PLCC 44	8-Bit CMOS	- Same as 80C52	
SAB C502-L	12 MHz 20 MHz	PDIP 40 PLCC 44	8-Bit CMOS	- Same as 80C32 ROMLESS plus 256 bytes XRAM, 8 datapointers and 2 watchdogs	
SAB C502-R	12 MHz 20 MHz	PDIP 40 PLCC 44	8-Bit CMOS	- Same as C502-L plus 16K ROM	
SAB C502-2H	12 MHz	PLCC 44	8-Bit CMOS	- Hybrid version of SAB C502-R with 16K EEPROM	
SAB C503-L	12 MHz 20 MHz	PDIP 40 PLCC 44	8-Bit CMOS	- Same as 80C32 plus 10-bit A/D, 2 watchdogs	
SAB C503-R	12 MHz 20 MHz	PDIP 40 PLCC 44	8-Bit CMOS	- Same as 80C52 plus 10-bit A/D, 2 watchdogs	
SAB C503-1H	12 MHz	PLCC 44	8-Bit CMOS	- Hybrid version of SAB C503-R with 8K EEPROM	
SAB 80C32	12 MHz	PDIP 40 PLCC 44	8-Bit CMOS	- CMOS version of the SAB 8032	Being replaced by SAB C501 2Q94
SAB 80C32-16	16 MHz	PDIP 40 PLCC 44			
SAB 80C32-20	20 MHz	PDIP 40 PLCC 44			
SAB 80C52	12 MHz	PDIP 40 PLCC 44	8-Bit CMOS	- CMOS version of SAB 8052 - 8K of on-chip ROM for program memory	
SAB 80C52-16	16 MHz	PDIP 40 PLCC 44			
SAB 80C52-20	20 MHz	PDIP 40 PLCC 44			
SAB 80C535 SAB 80C535-16	12 MHz 16 MHz	PLCC 68	8-Bit CMOS	- CMOS version of the SAB 80535 with power saving modes	

Ordering information for all Integrated Circuits: All devices should be ordered by Part Number followed by the Package Designator (example — SAB 8031AP).

Legend	Package	Designator	Description
	PDIP	P	Plastic Dual In-line Package
	PLCC	N	Plastic J-Leaded Chip Carrier
	PQFP	S	Plastic Quad Flat Pak

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8-Bit Microcontrollers

Siemens Part Number	Clock Frequency	Package Type(s)	Description	Features
SAB 80C515	12 MHz	PLCC 68	8-Bit CMOS	- 80C535 with 8K of on-chip ROM for program memory
SAB 80C515-16	16 MHz			
SAB 83C515H-3J	12 MHz	PLCC 68	8-Bit CMOS Hybrid	- Hybrid combination of 80C515 with EEPROM that gives 8K ROM user programmable device
SAB 80C515A	18 MHz	PLCC 68	8-Bit CMOS	- Enhanced (software compatible) version of SAB 80C515 Romless, 256 Bytes on-chip RAM, 1K Byte on-chip XRAM, 8 input 10-Bit A/D converter, 3 16-Bit timer/counters, 1 datapointer, 2 watchdog timers, compare/capture unit with up to 4 high-speed PWM 12 interrupt vectors with 4 selectable priority levels
SAB 83C515A-5	18 MHz	PLCC 68	8-Bit CMOS	- Same as 80C515A with 32K ROM
SAB 83C515AH-5J	18 MHz	PLCC 68	8-Bit CMOS Hybrid	- Hybrid combination of 83C515A with 32K ROM EEPROM
SAB 80C537	12 MHz	PQFP 100 PLCC 84	8-Bit CMOS	- Enhanced (software compatible) version of the SAB 80C515 - ROMLESS, 256 Bytes RAM, 9 ports, 8-Bit A/D converter with programmable reference voltages, four 16-Bit timer/counters, powerful compare/capture Unit with PWM capability on up to 21 channels, fast 32-Bit division and 16-Bit multiplication, 8 datapointers, 2 serial interfaces, 14 interrupt sources, 2 watchdog timers
SAB 80C537-16	16 MHz	PLCC 84 PQFP 100	8-Bit CMOS	- Same as 12 MHz version
SAB 80C517	12 MHz	PLCC 84	8-Bit CMOS	- An 80C537 with the 8K of on-chip ROM for program memory
SAB 80C517-16	16 MHz	PLCC 84 PQFP 100	8-Bit CMOS	- Same as 12 MHz version
SAB 83C517H-3J	12 MHz	PLCC 84	8-Bit CMOS Hybrid	- Hybrid combination of 80C517 with EEPROM that gives 8K ROM user programmable device
SAB 80C517A	18 MHz	PLCC 84 PQFP 100	8-Bit CMOS	- Enhanced (software compatible) version of the SAB 80C517 - ROMless, 256 Bytes on-chip RAM, 2K Bytes on-chip XRAM, 12 input 10-Bit A/D converter, four 16-Bit timer/counters, powerful compare/capture unit with up to 21 high-speed PWM 16-Bit outputs and 5 capture inputs, fast 32-Bit division and 16-Bit multiplication, 32-Bit normalize and shift by hardware, 8 datapointers, 2 full duplex serial interfaces with programmable baud rate generators, 17 interrupt vectors with 4 selectable priority levels, 2 watchdog timers
SAB 83C517A-5	18 MHz	PLCC 84 PQFP 100	8-Bit CMOS	- 32K ROM version of the SAB 80C517A
SAB 83C517AH-5J	18 MHz	PLCC 84	8-Bit CMOS	- Hybrid combination of 80C517A with 32K EEPROM

16-Bit Microcontrollers

Siemens Part Number	Clock Frequency	Package Type(s)	Description	Features
SAB C165-L	20 MHz	MQFP 100	16-Bit CMOS	- Proprietary 16-bit CPU based on SAB 80C166 architecture, 2K on-chip RAM, 5 general purpose 16-bit timer/counters, 1 USART and 1 synchronous serial channel, 16 priority levels in each of 4 groups, peripheral event controller, 16M address space, Boolean arithmetic and bit processing, 77 general purpose I/O lines, 5 bus configurations with chip selects, Watchdog
SAB 80C166	20 MHz	PQFP 100	16-Bit CMOS	- Proprietary 16-Bit CPU, ROMless, 1K on-chip RAM, 10 channel 10-Bit A/D, 16 capture/compare channels, 5 general purpose 16-Bit timer/counters, 2 USART interfaces, 16 priority levels in each of 4 groups, peripheral event controller, 256K address space, Boolean arithmetic and bit processing, 76 general purpose I/O lines, Watchdog
SAB 83C166-5	20 MHz	MQFP 100	16-Bit CMOS	- Same as 80C166 with 32K ROM
SAB C167-L	20 MHz	MQFP 144	16-Bit CMOS	- Proprietary 16-bit CPU based on SAB 80C166 architecture, 2K on-chip RAM, 16 channels 10-bit A/D, 32 capture/compare channels, 5 general purpose 16-bit timer/counters, 1 USART and 1 synchronous serial channel, 16 priority levels in each of 4 groups, peripheral event controller, 16M address space, Boolean arithmetic and bit processing, 3 general purpose I/O lines, 5 bus configurations with chip selects, 4 channel 78 KHz PWM, Watchdog
SAB C167-1R	20 MHz	MQFP 144	16-Bit CMOS	- Same as SAB C167-L with 8K ROM

SIEMENS

Communication Integrated Circuits

Siemens Part Number	Package Type(s)	Description	Features
Digital Terminal ICs			
PEB 2070	PDIP 24 PLCC 28	ISDN Communications Controller (ICC)	- Support for LAPD protocol - Build-up of ISDN frame (2B + D) - Switching function for B-channels
PEB 2086	PDIP 40 PLCC 44	ISDN Subscriber Access Controller (ISAC-S)	- Combines features of PEB 2070 and PEB 2080
PSB 2110	PDIP 40 PLCC 44	ISDN Terminal Adaptor (ITAC)	- CCITT defined 'R' to 'S' interface adaptor - Supports rate adaption X.30 and V.110, ECMA 102, V.120, DMI MODE 2
PSB 2160	PDIP 24 PLCC 28	Audio Ringing Codec Filter (ARCOFI)	- ISDN programmable DSP codec filter for terminals - Includes DTMP and ringing generator
PSB2165	PDIP 28 PLCC 28R	Audio Ringing Codec Filter with Speakerphone (ARCOFI-SP)	- Programmable codec filter for terminals - Includes digital speakerphone control - Includes DTMF and ringing generator - Single 5V power supply
PSB 45030	PDIP 28 SO 28	Hands-free Add-on Circuit (HAC)	- Speakerphone Circuit for analog and digital phone applications - Anticlipping and automatic gain control - On-chip reference voltage
Data Communication ICs			
SAB 82525	PLCC 44	High Level Serial Communications Controller Extended (HSCX)	- SAB 82520 with DMA and other features
SAB 82526	PLCC 44	High Level Serial Communications Controller Extended (HSCX 1)	- A single channel SAB 82525
SAB 82532	PLCC 68	Enhanced Serial Communications Controller (ESCC2)	- ESCC2 is an upgraded version of SAB 82525 (HSCX) - Supports a number of different communication protocols: HDLC, SDLC, BISYNC, ASYNC (e.g., RS232) - Two independent full-duplex switchable serial channels - Transfer rate up to 10 Mbps (synchronous)
SAB 82538	160 QMPF	Eight Channel Enhanced Serial Communications Controller (ESCC8)	- ESCC8 is an 8 channel version of SAB 82532 (ESCC 2) - Supports a number of different communication protocols: HDLC, SDLC, BISYNC, ASYNC (e.g., RS232) - Eight independent full-duplex switchable serial channels - Transfer rates up to 10 Mbps (synchronous)
*PEB 20320	PMQFP 160	Multichannel Network Interface Controller for HDLC (MUNICH32)	- 32 channel HDLC controller - Supports H0, H11, H12 ISDN channels - On chip 64 channel DMA controller - 32 bit microprocessor interface - JTAG boundary scan test
Wireless Communication ICs			
TBB 200G	P-DSO-14	PLL	- Bit serial control with IIC bus - Modulus control - Voltage doubler for high phase detector output voltage - Extremely fast phase detector with very short anti-backlash pulse - High input frequency (70 MHz) - High input sensitivity (50 mV)
TBB 206G	P-DSO-14	PLL	- As above with 3-wire control bus - High input frequency (90 MHz) - High input sensitivity (100mV)

* Advance Information

Ordering information for all Integrated Circuits: All devices should be ordered by Part Number followed by the Package Designator (example—SAB 82525N).

Legend	Package	Designator	Description
	PDIP	P	Plastic Dual In-line Package
	PLCC	N	Plastic J-Leaded Chip Carrier
	SO	T	Small Out-line Package
	PMQFP	H	Plastic Metric Quad Flat Package

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Communication Integrated Circuits

Siemens Part Number	Package Type(s)	Description	Features
Wireless Communication ICs (continued)			
TBB 204G	P-DSO-14	Mixer/Oscillator	- Integrated mixer, balanced RF oscillator and buffer amplifier for operation between 10 MHz and 1 GHz - Separate input and output pins for the mixer and oscillator allow independant operation
PMB 2200T PMB 2200T-16 PMB 2200S	P-DSO-20 P-DSO-16 P-DSO-20S	RF Transmitter Circuit	- Direct quadrature modulation - LO frequency range 800 MHz to 1 GHz - Modulation frequency range 0 to 400 MHz - Double balanced mixers - Generation of orthogonal carriers without external components
PMB 2205T PMB 2205S	P-DSO-20 P-DSO-20S	RF Transmitter Circuit	- As above with LO frequency range 50 MHz to 800 MHz - Direct drive of internal phase shifter
PMB 2206S	P-DSO-20S	RF Transmitter and Mixer	- Forward integration of RF Transmitter Circuit PMB 2205 and Mixer PMB 2330
PMB 2210T	P-DSO-20	Quadrature Modulator	- Quadrature modulation up to 1 GHz - Double-balanced mixer with two Gilbert cells
PMB 2220S	P-DSO-20S	DECT Transmitter	- Two integrated VCOs - 64/65 prescaler - Frequency doubler for receive and transmit mode with balanced driver outputs - Supply voltage regulator for the two VCOs
PMB 2230S	P-DSO-24S	FM Transmitter	- VCO offset modulator with integrated RF and IF VCOs for applicatons in FM and QPSK systems - High gain output (> -4dBm up to 1.5 GHz)
PMB2306T	P-DSO-T	PLL	- 3-wire serial control bus for fast programming (max. clock frequency 10 MHz) - Phase detector signal with adjustable anti-backlash pulses - Extremely fast phase detection (<100 ps) - High input frequency (220 MHz)
PMB2312T	P-DSO-8	Prescaler	- Switchable divide ratios 1:64/65 and 1:128/129 for single and dual modulus frequency synthesizer - Wide input frequency range (140 MHz-1100 MHz)
PMB 2330T	P-DSO-8	Mixer	- Universal mixer for frequencies up to 2.5 GHz - Very highly isolated RF, IF and LO ports
PMB 2401S	P-DSO-24S	RF Receiver	- Heterodyne receiver with on-board quadrature demodulation - Double-balanced front end mixer up to 1.2 GHz - Downward mixing from 900 MHz receiver band to the base band - Two balanced operational amplifiers for additional base band filtering
PMB 2402S	P-DSO-24S	RF Receiver	- As above with an output bandwidth of 13.5 MHz
PMB 2403S	P-DSO-24S	RF Receiver	- Same features as PMB 2403 without demodulator
PMB 2420S	P-DSO-28S	DECT Receiver	- Single-balanced RF mixer - Limiter and RSSI dynamic range > 70dB - Data slicer to compensate possible frequency offsets
PMB 2430S	P-DSO-28S	FM Receiver	- Double conversion heterodyne receiver with limiter/demodulator - Double balanced Gilbert cell mixers on first and second IF stages - IF limiter amplifier gain >90 dB at second IF stage
PMB 2432S	P-DSO-28S	FM Receiver	- Same features as PMB 2432 with first double balanced mixer - Integrated oscillator for the second IF
PMB 2434S	P-DSO-28S	FM Receiver	- Same features as PMB 2430 - Second IF max. 15 MHz - Signal output bandwidth max. 1 MHz
Exchange ICs			
PEB 2052	PDIP 40 PLCC 44	PCM Interface Controller (PIC)	- Linecard controller for Analog Loop applications - Programmable time-slot assignment - One full duplex PCM highway for the system interface
PEB 2055	PDIP 40 PLCC 44	Extended PCM Interface Controller (EPIC)	- Linecard controller for ISDN applications - Programmable time-slot assigner for four system interfaces - Compatible to SLD and IOM interfaces

Communication Integrated Circuits

Exchange ICs (continued)

Siemens Part Number	Package Type(s)	Description	Features
PEB 2060	PDIP 22 PLCC 28	Signal Processing Codec Filter (SICOFI)	- Programmable DSP codec filter - A/D, D/A conversion and PCM coding/decoding in A-law and U-law
PEB 2075	PDIP 28 PLCC 44	ISDN D-Channel Exchange Controller (IDEC)	- 4 PEB 2070 ICCs on one chip
PEB 2081	PDIP 28 PLCC 28	S Bus Interface Circuit Extended (SBCX)	- Enhanced S Bus transceiver according to 1.430 - Automatic handling of S and Q Bit messages - Software controlled maintenance interface - 11-Bit buffer for phase wander compensation in network applications
PEB 2091	PLCC 44	ISDN Echo Cancellation Circuit (IEC-Q)	- 2B1Q "U" interface transceiver - Conforms to North American "U" interface standard
PEB 2260	PLCC 28	Signal Processing Codec Filter (SICOFI II)	- Two PEB 2060s on a single chip - Will support both SLD and IOM^2 interfaces

PRI/Switching ICs

Siemens Part Number	Package Type(s)	Description	Features
PEB 2035	PDIP 40 PLCC 44	Advanced CMOS Frame Aligner (ACFA)	- Provides frame alignment 1.544 and 2.048 Mbit systems - Supports T1 and CEPT ISDN formats - Coding and decoding for HDB3 and B8ZS - Error checking via CRC 4 or CRC 6
PEB 2045	PDIP 40 PLCC 44	Memory Time Switch CMOS (MTSC)	- Time/Space switch for 2.048, 4.096 and 8.192 Mbit systems - Microprocessor interface for writing to/reading from connection memory
PEB 2046	PDIP 40 PLCC 44	Memory Time Switch Small (MTSS)	- A Time/Space switch with limited functionality for smaller networks
PEB 2047	PDIP 40 PLCC 44	Memory Time Switch Large (MTSL)	- A Time/Space switch for larger networks - Switching capacity 1024 x 512 subscribers
PEB 2236	PDIP 28 PLCC 28	ISDN Primary Access Transceiver (IPAT 2)	- Transceiver for 1.544 Mbit and 2.048 Mbit systems - Supports CEPT and T1 ISDN formats
PEB 2245	PLCC 44	Multipoint Switching and Conference Unit (MUSAC)	- Up to 64 conference channels in any combination - Up to 21 independent conferences simultaneously (3 subscribers) - Switching up to 512 incoming PCM channels to 256 outgoing PCM channels
*PEB 3040	PLCC 44	Link Controller for Signaling System #7 (LCS7)	- Two independent signaling channels - Support of SS#7 protocol in auto mode

* Advance Information

SIEMENS

Automotive Integrated Circuits

Siemens Part Number	Voltage Supply	Package Type(s)	Description	Features	
Hall Effect Integrated Circuits					
TLE4905L	4.3 to 24	SFP 3	Switch	- Low Cost	- Reverse Polarity Protected
TLE 4921-2G	3.5 to 24	SO 8	Differential – Dynamic	- Wide Airgap – 3.5mm - Fully Protected*	- Surface Mount Package
TLE 4921-2U	4.5 to 24	UFP 4	Differential – Dynamic	- Wide Airgap – 3.5mm - Fully Protected*	- Active Low Output - Ultra Flat Package
TLE 4935L	3.5 to 24	SFP 3	Latch	- Low Cost	- Reverse Polarity Protected
TLE 4974U	4.5 to 24	UFP 4	Differential – Static	- Fully Protected* - Zero RPM Sensing	- Ultra Flat Package - Symmetrical Output
Motor Drivers					
TLE 4202B	3.5 to 40	TO 220-7	Dual 2 Amp Driver	- Low Voltage Operation - Short and Temp Protected	- Integrated Freewheeling Diodes - Temp Range –40°C to 130°C
TLE 4203	5 to 45	TO 220-7	Dual 4 Amp Driver	- Short and Temp Protected - Integrated Output Diodes	- Temp Range –40°C to 130°C
TLE 4205	6.5 to 45	PDIP 18	Dual 1 Amp Driver	- Short and Temp Protected - Integrated Output Diodes	- Temp Range = -40 to 130°C
Intelligent Power Switches					
TLE 4211	5 to 20	TO 220-7	Dual 2 A Low-Side	- Error Monitoring (Status) - Fully Protected**	- Temp Range = -40 to 125°C - Integrated Clamp Diodes
TLE 4214	6.5 to 18	PDIP 8	Dual 0.5 A Low-Side		
TLE 4215	6.5 to 45	PDIP 16	Dual 0.5 A High-Side		
TLE 4216	5.2 to 30	PDIP 20	Hex Low-Side	- Error Monitoring (Status) - Fully Protected**	- Temp Range = -40 to 110°C
TLE 4220	6.5 to 18	TO 220-7	Single 4 Amp Low-Side		
TLE 4224	6.5 to 40	TO 220-7	Single 4 Amp Low-Side	- Error Monitoring (Status) - Fully Protected**	- Temp Range = -40 to 110°C - BiMOS Technology RDS "ON" = 0.25 Ohms
Low Drop Voltage Regulators					
TLE 4260	6 to 40	TO220-7	5V, 500mA LDVR	- On Chip Reset - 700uA Standby Current - Fully protected*	- Temp Range = -40 to 125°C - EMI Rating > 120V/m
TLE 4260-2	6 to 40	TO220-7	5V, 500mA LDVR	- 2% Tolerance Version of the TLE4260	
TLE 4261	6 to 40	TO220-7	5V, 500mA LDVR	- On Chip Reset - On Chip Watchdog - Inhibit Input - 50uA Standby Current - Fully Protected*	- Temp Range = -40 to + 125°C - EMI Rating > 120V/m
TLE 4261-2	6 to 40	TO220-7	5V, 500mA LDVR	- 2% Tolerance Version of the TLE 4261	
TLE 4262G	5.2 to 45	SO20L	5V, 200mA LDVR	- On Chip Reset - Inhibit Input - 50uA (inhibit) Current - Fully Protected*	- Temp Range = -40 to + 125°C - EMI Rating > 120V/m - Output Tolerance 2%
TLE4263G	5.2 to 45	SO20L	5V, 200mA LDVR	- On Chip Reset - On Chip Watchdog - Inhibit Input - 50uA (inhibit) Current - Fully Protected*	- Temp Range = -40 to + 125°C - EMI Rating > 120V/m - Output Tolerance 2%

Ordering information for all Integrated Circuits: All devices should be ordered by Part Number followed by the Package Designator (example—TLE 4905L).

Legend	Package	Designator	Description	Package	Designator	Description		
	FP	F	3 Pin Single In-line Package	SIP	F	3 Pin Single In-line Package	* Overvoltage Protected	** Power Limitation
	SO	G, X	Small Out-line Package	TO 220	NONE	Plastic Power Package	Reverse Polarity Protected	Overvoltage
	DIP	None	Dual In-line Package				Load Dump Protected	Overtemperature
	UFP	U	Ultra flat 4 Pin-SIP					Short Circuit
	SFP	L	Small Out-line 3 Pin-SIP					

Selected products are available as chips in waferform, contact your Siemens representative.

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Power / Smart SIPMOS

TEMPFET

Siemens Part Number	Drain-Source Voltage	Drain-Source On-State Resistance	Continuous Drain Current	Package Type(s)	Features	Note
			MOS			
BTS 100	–50	300 mOhm	–8A	TO 220	- P Channel	TEMPFET: Short circuit and overtemperature protected chip-on-chip transistor. The protection is provided by the sensor chip that shuts off the power chip when the junction temperature is >150°C. Available in N- and P-channel versions.
BTS 110	100	200 mOhm	10A	TO 220		
BTS 112A	60V	150 mOhm	12A	TO 220		
BTS 113A	60V	170 mOhm	11.5A	TO 220	- Logic Level	
BTS 114A	50	100 mOhm	14A	TO 220	- N Channel	
BTS 115A	50	125 mOhm	12.5A	TO 220	- Logic Level	
BTS 120A	100	100 mOhm	19A	TO 220		
BTS 121A	100	120 mOhm	22A	TO 220		
BTS 129	60	50 mOhm	27A	TO 220		
BTS 130	50	50 mOhm	27A	TO 220		
BTS 131	50	60 mOhm	25A	TO 220	- Logic Level	
BTS 132	60	65 mOhm	24A	TO 220	- Logic Level	
BTS 140A	50	28 mOhm	42A	TO 220		
BTS 240A	50	18 mOhm	58A	TO 218		

PROFET (Single Output)

Siemens Part Number	Drain-Source Voltage	Drain-Source On-State Resistance	Continuous Drain Current		Package Type(s)	Features	Note
			ISO	MOS			
BTS 410D	>50	200 mOhm	1.6A	13A	TO 220-5	- Short circuit protection - Overtemperature protection - Overload protection - Over/under voltage shutdown - Open load detection - ESD protection - Status feedback to monitoring system - PWM control (629A)	PROFET: A fully protected intelligent CMOS and TTL compatible high-side switch. Constructed using monolithic or chip-on-chip technology. ISO current rating at Tc=85°C. MOS current rating at Tc=25°C.
BTS 410E	>50	200 mOhm	1.6A	13A	TO 220-5		
BTS 410F	>50	200 mOhm	1.6A	13A	TO 220-5		
BTS 410H	>50	220 mOhm	1.6A	13A	TO 220-5		
BTS 412A	45	400 mOhm	1.0A	9.5A	TO 220-5		
BTS 412B	>50	300 mOhm	1.4A	12A	TO 220-5		
BTS 413A	45	400 mOhm	1.0A	9.5A	TO 220-5		
BTS 432D	>50	38 mOhm	9A	20A	TO 220-5		
BTS 432E	>50	38 mOhm	9A	20A	TO 220-5		
BTS 432F	>50	38 mOhm	9A	20A	TO 220-5		
BTS 432L1	>50	38 mOhm	9A	20A	TO 220-5		
BTS 542D	>50	22 mOhm	17A	42A	TO 218-5		
BTS 542E	>50	22 mOhm	17A	42A	TO 218-5		
BTS 629A	>50	180 mOhm	2.0A	14A	TO 220-7		

Legend	Package	Designator	Description
	TO 220	None	Plastic Power Package
	TO 218	None	Plastic Power Package

Industrial

Power Factor Correction and Switch Mode Power Supply Controllers

Siemens Part Number	Voltage Supply	Package Type(s)	Description	Features
TDA 4700A	10.5 to 30	PDIP 24	SMPS Controller	- Feed-forward control - Over/under voltage protection - Double pulse suppression
TDA 4718A	10.5 to 30	PDIP 18	SMPS Controller	- Feed-forward control - Over/under voltage protection - Double pulse suppression
TDA 4814A	<17	PDIP 14	IC for Lamp Ballasts	- Facilitates design of SMPS with sinusoidal line current consumption and design of electronic ballasts - Power factor = 0.97 - With start/stop function
TDA 4815A TDA 4815G	<17	PDIP 20 PDSO 20	Power Factor Controller	- Trapezoidal waveform - Power factor = 0.97 - Wide range input voltage - Feed forward control - Fully protected - Fixed frequency - SIPMOS driver output - Under 500 W
TDA 4816G	<17	PDSO 16	IC for Lamp Ballasts	- Facilitates design of SMPS with sinusoidal line current consumption - Fixed frequency - Free oscillation
TDA 4817A TDA 4817G	<17	PDIP 8 PDSO 8	IC for Lamp Ballasts	- Facilitates design of SMPS with sinusoidal line current consumption and design of electronic ballasts - Power factor = 0.97 - Without start/stop function
TDA 4818A TDA 4818G	<17	PDIP 20 PDSO 20	Power Factor Controller	- Triangular waveform - Power factor = 0.97 - Wide range input voltage - Feed forward control - Fully protected - SIPMOS driver output - Under 500 W
TDA 4819A TDA 4819G	<17	PDIP 16 PDSO 20	Power Factor Controller	- Trapezoidal waveform - Power factor = 0.97 - Wide range input voltage - Feed forward control - Fully protected - SIPMOS driver output
TDA 4918A TDA 4918G	30	PDIP 20 SO 20	Control for Push-Pull SMPS	- SIPMOS driver output - 150 KHz operation
TDA 4919A TDA 4919G	30	PDIP 20 SO 20	Control for Single-Ended SMPS	- SIPMOS driver output - 300 KHz operation

Siemens

Ordering information for all Integrated Circuits: All devices should be ordered by Part Number followed by the Package Designator (example—TCA 305AP).

Legend	Package	Designator	Description
	PDIP	P	Plastic Dual In-line Package
	Micropack	K	Tape Mounted Circuit
	SO	G	Small Out-line Package

Selected products are available as chips in waferform, contact your Siemens representative.

Siemens Components, Inc., 10950 North Tantau Avenue, Cupertino, CA 95014-0716 Tel: 800-77-SIEMENS

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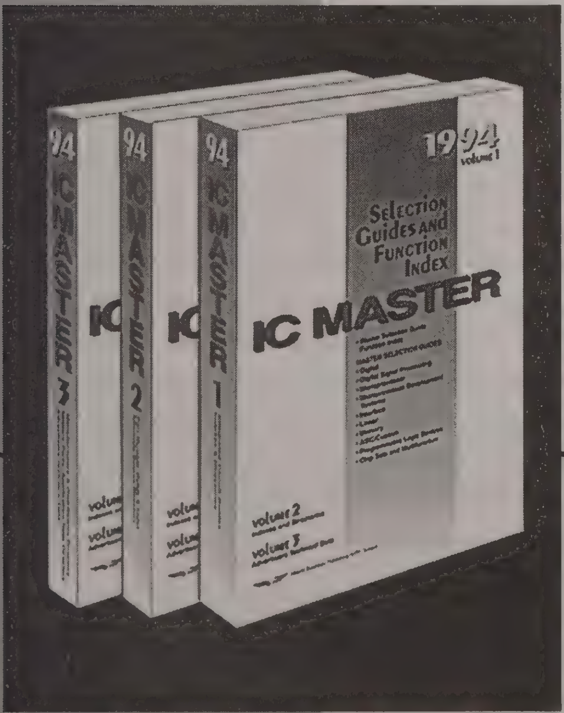

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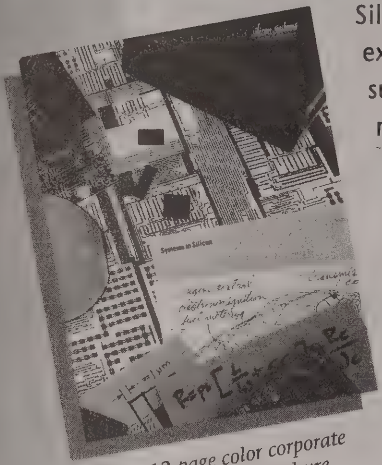
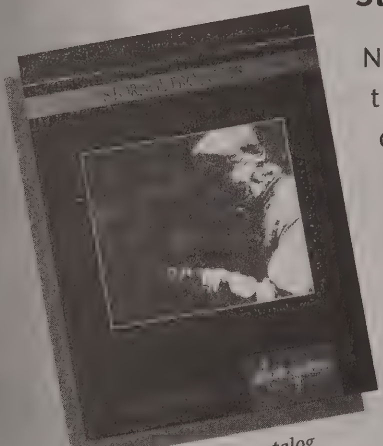


A 12-page color corporate capabilities brochure

Silicon Systems was founded on its strength of design expertise. As it grew to add manufacturing capability, its successes were many in an industry known for its cyclic nature. Now, as one of the newest TDK Group Company members, Silicon Systems has added to its strengths the financial stability and resources associated with being part of a large global corporation.

For more than 20 years we at Silicon Systems have developed the highest possible level of technical expertise by designing and manufacturing both custom and standard mixed-signal integrated circuits (MSICs®) featuring analog and digital functions on the same chip. While standard products primarily target three niche markets – disk/tape storage, communications and industrial products – many products within our portfolio, particularly custom solutions, have had broader applications. The company is structured into two business units – the Storage Products Division and the Communications and Industrial Products Division.

Storage Products



A full-line catalog of disk/tape storage IC products

Nowhere has our success been more apparent than in the disk drive sector. Simply put, Silicon Systems dominates the hard disk drive IC business. With the exception of the microprocessor and memory, our chips provide every function within the drive. Because we offer a total solution in the form of read/write and servo preamp, pulse detector/programmable filter, data recovery or disk controller products – or various combinations of these functions – we hold a major worldwide market share in drive electronics ranging from low-power portable products to high-performance work stations. Product focus within this division is also being expanded to include additional magnetic and optical storage devices.

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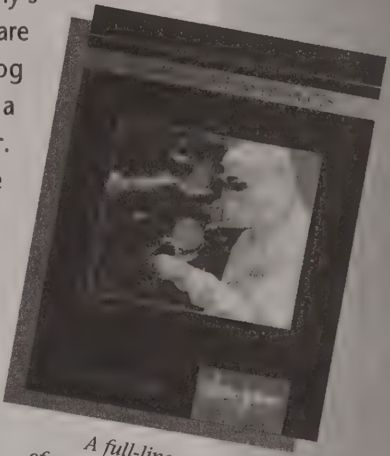
...with Mixed-Signal ICs – "MSICs®"

Communications and Industrial Products

Our K-series modem ICs are the cornerstone to the company's standard communications products. These chips and chip sets are truly systems-level products, combining front-end analog functions with Silicon Systems-developed firmware, a preprogrammed digital signal processor and microcontroller. Other standard products include DTMF circuits, bus interface products, digital transmission and local area network ICs. Future directions will see a migration toward high-end wired and wireless communications devices, spearheaded by customer-driven designs, which comprise easily one half of Silicon Systems' business.

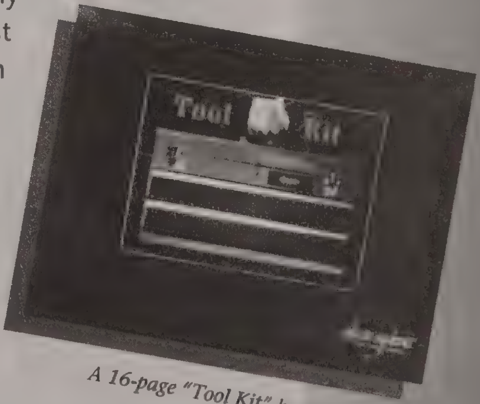
Mixed-signal expertise is also well-suited to the requirements of a broad range of industrial applications.



A full-line catalog of communication IC products

Quality Throughout

Whether your needs are for Silicon Systems' custom solutions or a standard product, we can offer truly innovative design and performance. To maintain our position of leadership in the mixed-signal area, we realize the need to combine innovation and consistently improving levels of quality. To do this, we must continually improve the quality of goods and services in every area of our operation, from administration and manufacturing procedures, to our approach to design. For Silicon Systems the only true definition of quality is customer satisfaction. Quality improvement is a major element of the company's aggressive plans for future growth. A focused effort on continual improvement includes a master quality plan with specific, incremental quantitative goals. The most important element of our goals for improvement, however, begins and ends with the customer.



A 16-page "Tool Kit" brochure

For specific product literature, contact Silicon Systems, your local sales representative, or call our toll-free number **1-800-624-8999 ext. 151**.

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Storage Products Selector Guide

Device Number	Head Type	Number of Channels	Max Input Noise (nV/√Hz)	Max Input Capacitance (pF)	Read Gain (typ)	Write Current Range (mA)	Power Supplies (V)	Write Data Ports	Min. Head Swing (V)
HDD READ/WRITE AMPLIFIERS									
SSI 32R511/511R	3 Terminal	4, 6, 8	1.5	20	100	10 to 40	+5, +12	TTL	7.0 (0-pk)
SSI 32R516	3 Terminal	4, 6, 8	1.3	18	120	10 to 60	+5, +12	TTL	7.0 (0-pk)
SSI 32R5161R	3 Terminal	10	1.3	18	150	10 to 60	+5, +12	TTL	7.0 (0-pk)
SSI 32R1200/1201	3 Terminal	2, 4	1.2	17	200	15 to 50	+5	TTL	6.0 (0-pk)
SSI 32R512/512R	2 Terminal	8, 9	0.85	35	150	10 to 40	+5, +12	TTL	7.0 (pk-pk)
SSI 32R5121/5121R	2 Terminal	14	0.85	35	250	10 to 40	+5, +12	TTL	7.0 (pk-pk)
SSI 32R524R	2 Terminal	8	0.75	60	100	20 to 60	+5, +12	TTL	7.0 (pk-pk)
SSI 32R528R	2 Terminal	8, 9	0.85	35	150	10 to 40	+5, +12	Differential	7.0 (pk-pk)
SSI 32R5281	2 Terminal	14	0.85	35	250	10 to 40	+5, +12	Differential	7.0 (pk-pk)
SSI 32R1510R	MR	8	0.95	18	150	20 to 50	+5, +12	Differential	8.0 (pk-pk)
SSI 32R2010R/2011R	2 Terminal	10	0.84	26	150	10 to 25	+5, +12	Differential	7.0 (pk-pk)
SSI 32R2015R	2 Terminal	16	0.84	26	150	10 to 25	+5, +12	TTL	7.0 (pk-pk)
SSI 32R2020R/2021R	2 Terminal	2, 4, 10	0.8	20	300	5 to 35	+5	TTL	4.2 (pk-pk)
SSI 32R2024	2 Terminal	4	0.75	22	150, 200, 300	5 to 40	+5	TTL	4.2 (pk-pk)
SSI 32R2025	2 Terminal	4	0.75	22	300	5 to 35	+5	TTL	4.2 (pk-pk)
SSI 32R2026	2 Terminal	4	0.75	22	300	5 to 35	+5	TTL	4.2 (pk-pk)
SSI 32R2030A/2031A	2 Terminal	2, 4	0.85	35	250	10 to 35	+5	TTL	3.4 (pk-pk)
SSI 32R2040	2 Terminal	14	0.8	22	250	10 to 40	+5, +12	Differential	7.0 (pk-pk)
SSI 32R2041	2 Terminal	4, 6	0.8	22	250	10 to 40	5, 12	ECL	7.0 (pk-pk)
SSI 32R2060	2 Terminal	8	0.75	22	150	5 to 35	+5	TTL	4.2 (pk-pk)
SSI 32R2063/64/65	2 Terminal	4	0.75	22	150, 200	3 to 40	+5	TTL/ECL	4.2 (pk-pk)
SSI 32R2100	2 Terminal	10	0.70	18	250	5 to 40	+5, +12	ECL	10.0 (pk-pk)
SSI 32R2110	2 Terminal	18, 24	0.70	18	250	5 to 40	+5, +12	ECL	10.0 (pk-pk)
SSI 32R2200/2201	2 Terminal	4, 6	0.70	18	250	3 to 35	+5	ECL/TTL	6.0 (pk-pk)
SSI 32R2300/2300R/2310	2 Terminal	4	0.75	20	200	3 to 25	+3.3/+5	TTL	3.4 (pk-pk)
SSI 32R4610A/4611A	2 Terminal	2, 4, 8	0.85	35	200	10 to 35	+5	TTL	3.4 (pk-pk)

Device Number	Circuit Function	Features
HDD PULSE DETECTION		
SSI 32P544	Pulse Detector	32P541-type Pulse Detector w/ Embedded Servo Electronics
SSI 32P547	Pulse Detector	32P544-type Pulse Detector w/ Filter Multiplexer, Pulse Slimming Support
SSI 32P549	Read Data Processor	32P541 pin compatible, Low Power, +5V only, Enhanced Write to Read Recovery
SSI 32P5491	Read Data Processor	32P549 pin compatible, 5 mW Idle Mode power, Pd = 170 mW
SSI 32P3000/3001	Pulse Detector / Programmable Filter	64 Mbit/s Pulse Detector w/9-27 MHz Bessel filter (3000), 8-24 MHz filter (3001), +5V only
SSI 32P3013	Pulse Detector / Programmable Filter	48 Mbit/s Pulse Detector w/9-27 MHz Bessel filter, 4-burst servo capture
SSI 32P3015	Pulse Detector / Programmable Filter	64 Mbit/s Pulse Detector w/9-27 MHz Bessel filter, 4-burst servo capture, adjustable RD pulse width
SSI 32P3030	Pulse Detector / Servo Demodulator	Pulse Detector w/2-burst servo demodulator, +5V only
SSI 32P3040/41	Pulse Detector / Programmable Filter	24-32 Mbit/s Pulse Detector w/2.5-13 MHz Bessel filter, +5V only
HDD READ CHANNEL COMBINATION DEVICES		
SSI 32P5482	Pulse Detector / Data Synchronizer	Low power 32P548-type device (350 mW), no Write Precompensation
SSI 32P4730	Complete Read Channel	Pulse Detector/Filter/Servo/Time Base/Data Separator, 24 Mbit/s <500 mW, 64 TQFP
SSI 32P4733	Complete Read Channel	12 to 36 Mbit/s, 2 burst servo, No ENDEC
SSI 32P4741	Complete Read Channel	4731 with 14 to 40 Mbit/s operation
SSI 32P4742	Complete Read Channel	4731 with 16 to 48 Mbit/s, Dual-bit NRZ
SSI 32P4743	Complete Read Channel	4733 with 16 to 48 Mbit/s, Dual-bit NRZ
SSI 32P4744	Complete Read Channel	4730 with 14 to 40 Mbit/s
SSI 32P4745	Complete Read Channel	4742 with soft sector mode, full wave rectifier servo output
HDD ACTIVE FILTERS		
SSI 32F8001/02/03	Low Power Programmable Electronic Filter	7-Pole Equiripple Active Filter, Programmable Cutoff Frequency / Pulse Slimming, 9 - 27 MHz (8001), 6-18 MHz (8002), 5-13 MHz (8003)
SSI 32F8011/8012	Programmable Electronic Filter	7-Pole Bessel Active Filter, Programmable Cutoff Frequency / Pulse Slimming, (5 - 13 MHz, 8011) (6-15 MHz, 8012)
SSI 32F8020A	Low Power Programmable Electronic Filter	7-Pole Equiripple Active Filter, Programmable Cutoff Frequency / Pulse Slimming, 1.5 - 8 MHz
SSI 32F8030	Programmable Electronic Filter	7-Pole Equiripple Active Filter, Programmable Cutoff Frequency / Pulse Slimming, 250 kHz - 2.5 MHz
SSI 32F8101/2/3/4	Low Power Digitally Programmable Filter	Serial Port & DACs, 95 mW, 9 - 27 MHz (8101), 6-18 MHz (8102), 4-12 MHz, (8103), 3-9 MHz (8104)
SSI 32F8120	Low Power Digitally Programmable Filter	32F8020 with serial port and DACs
SSI 32F8130/31	Low Power Digitally Programmable Filter	32F8030 with serial port and DACs / 32F8131 = 150 kHz < f_c < 1.5 MHz

HDD DATA RECOVERY		
SSI 32D4040/41	Data Separator	Data Synchronizer / 1, 7 RLL ENDEC, 20 to 64 Mbit/s, Write Precompensation Window Shift; 4041 has no write data F/F
SSI 32D5321	Data Separator	Data Synchronizer / 2, 7 RLL ENDEC 7.5 to 10 Mbit/s
SSI 32D5322A	Data Separator	Data Synchronizer / 2, 7 RLL ENDEC 7.5 to 13 Mbit/s
SSI 32D534A	Data Separator	Data Synchronizer / MFM ENDEC / Write Precompensation
SSI 32D5351A	Data Separator	Data Synchronizer / 2, 7 RLL ENDEC / Write Precompensation 8 to 18 Mbit/s
SSI 32D5362A	Data Separator	Data Synchronizer / 1, 7 RLL ENDEC / Write Precompensation 10 to 20 Mbit/s
SSI 32D5371/2	Data Separator	Data Synchronizer / 1, 7 RLL ENDEC / Write Precompensation 12 to 24 Mbit/s
SSI 32D5373/4	Data Separator	Data Synchronizer / 1, 7 RLL ENDEC / Write Precompensation 15 to 32 Mbit/s
SSI 32D539	Data Separator	Data Synchronizer / 1, 7 RLL ENDEC / 8-bit parallel NRZ 24 to 48 Mbit/s
SSI 32D5391/3	Data Separator	Data Synchronizer / 1, 7 RLL ENDEC / Serial NRZ 24 to 40 Mbit/s
SSI 32D5392/4	Data Separator	Data Synchronizer / 1, 7 RLL ENDEC / Dual-bit NRZ 24 to 48 Mbit/s
SSI 32D4660/1/2/3/4/5/6	Time Base Generator	Up to 100 MHz Reference Frequency PLC for Constant Density Recording
HDD HEAD POSITIONING		
SSI 32H523AR	Servo Read/Write	Single-channel Thin Film Read/Write Device
SSI 32H566R	Servo Read/Write	Single-channel Ferrite Read/Write Device
SSI 32H569	Servo Motor Driver	Head Parking, Spindle Motor Braking
SSI 32H4633	Combo Servo & Motor Speed Control	Embedded & Hybrid Servo, Hall Sensorless Motor Speed Control, 5400 RPM
SSI 32H6110	Preamplifier -Thin Film head	AV = 250 or 300, BW = 20 MHz, e_n = 0.85 nV/√Hz
SSI 32H6210	Servo Demodulator	Di-bit Quadrature Servo Pattern; PLL Synchronization AGC Adjustment
SSI 32H6215	Servo 5V Demodulator	5V, 500 kHz frame rate Dedicated Servo Demodulator
SSI 32H6220	Servo Controller	Track & Seek Mode Operation; Microprocessor Interface
SSI 32H6230/1	Servo Motor Driver	Head Parking, Spindle Motor Braking, Voltage Clamp
SSI 32H6240	Servo Motor Driver	Predriver for Bipolar H-bridge
SSI 32H6510	Servo 5V Driver	Low Voltage Retract, 1Ω drivers
SSI 32H6520	Servo Acquisition and D/A	10-bit A/D D/A circuits, DSP interface
SSI 32H6810/6810A	Servo/Spindle 5V Driver	Combo driver supports 5V @ 1.0A, Voltage IN
SSI 32H6811	Servo/Spindle 5V Driver	Combo driver supports 5V @ 1.0A, Voltage IN, Serial Port with DACs
SSI 32H6830	Servo/Spindle DSP Controller	DSP with 10-bit A/D & Dual D/A converters
HDD SPINDLE MOTOR CONTROL		
SSI 32M593A	3-Phase Motor Speed Control	±0.037% Speed Accuracy; Bipolar Operation, 5 1/4" Drives
SSI 32M594	3-Phase Motor Speed Control	±0.037% Speed Accuracy; Bipolar Operation, 3 1/2" & 5 1/4" Drives
SSI 32M595	3-Phase Sensor-less MSC	Hall Sensorless; Motor Speed Control
SSI 32M7010	Motor Speed Control 5V Driver	Hall Sensorless; Commutator Digital Speed Control, 5V 1Ω Driver
SSI 32M7011	Motor Speed Control 5V Commutator	Hall Sensorless; Commutator, 5V 1Ω Driver
HDD CONTROLLER/INTERFACE		
SSI 32C9001	ATA Combo Controller	48 Mbit/s; High Performance ATA Disk Controller
SSI 32C9003	High Perf. ATA Combo Controller	72 Mbit/s; LBA mode; Automated multi commands
SSI 32C9020	High Perf. SCSI Combo Controller	48 Mbit/s; SCSI-2 compatible; Fast SCSI; single ended
SSI 32C9022	Dual-bit High Perf. SCSI Combo Controller	Dual-bit NRZ, 48 Mbit/s; SCSI-2 compatible; Fast SCSI
SSI 32C9023	Dual-bit High Perf. SCSI Combo Controller	Dual-bit NRZ, 72 Mbit/s; SCSI-2 compatible; Fast SCSI
SSI 32C9024	Dual-bit High Perf. SCSI Combo Controller	Dual-bit NRZ, 72 Mbit/s; SCSI-2 compatible; Fast SCSI; Differential
SSI 32C9301	High Perf. ATA Combo Controller (3V, 5V)	32 Mbit/s (3V), 48 Mbit/s (5V); LBA mode support
SSI 32C9302	Dual-bit High Perf. ATA Combo Cont. (3V, 5V)	Dual-bit NRZ, 32 Mbit/s (3V), 48 Mbit/s (5V); LBA mode support
SSI 32C9340	Dual-bit PCMCIA/ATA Combo Controller (3V, 5V)	Dual-bit NRZ, 48 Mbit/s (3V/5V)
SSI 32C9600	ATA-2 Controller	160 Mbit/s; ATA/ATA-2 Compatible; Wide Buffer; Advanced Reed-Solomon ECC
FLOPPY DISK DRIVES		
SSI34P553/5531	Pulse Detector/Data Synchronizer	0.6 - 1.6 Mbit/s data rate, MFM or 2, 7 RLL code
SSI 34P3200	Pulse Detector/Data Synchronizer	250K - 6 Mbit/s
SSI 34P3201	Pulse Detector/Data Synchronizer	250K - 8 Mbit/s
SSI 34R1203R	5V, 2-, 4-Channel, 3-Terminal R/W	Selectable gain, 250 V/V and 85 V/V
OPTICAL DISK DRIVES		
SSI 33P3733	Read Channel, No ENDEC	Pulse detector/filter/time base generator/data separator, 8 - 26.5 Mbit/s
SSI 33P3733A	Read Channel, No ENDEC	33P3733 with MO pit qualifier
TAPE DRIVES		
SSI34P553/5531	Pulse Detector/Data Synchronizer	0.6 - 1.6 Mbit/s data rate, MFM or 2, 7 RLL code
SSI 34P3200	Pulse Detector/Data Synchronizer	250K - 6 Mbit/s
SSI 34P3201	Pulse Detector/Data Synchronizer	250K - 8 Mbit/s

Silicon Systems

Communication/Industrial Products Selector Guide

Device Number	B212 B103	B202	CCITT V.21	CCITT V.23	CCITT V.22	CCITT V.22bis	Description	Power Supply	Available Packages
K-SERIES SINGLE CHIP MODEM FAMILY									
SSI 73K212	✗						Bell 212A/103	+12V	28 DIP, 28 PLCC
SSI 73K212S	✗						73K212 with serial interface only	+12V	22 DIP
SSI 73K212L	✗						Low Power 73K212	+5V	28 DIP, 28 PLCC
SSI 73K212SL	✗						73K212L with serial interface only	+5V	22 DIP
SSI 73K221			✗		✗		CCITT V.22/V.21	+12V	22, 28 DIP, 28 PLCC
SSI 73K221S			✗		✗		73K221 with serial interface only	+12V	22 DIP
SSI 73K221L			✗		✗		Low Power 73K221	+5V	22, 28 DIP, 28 PLCC
SSI 73K221SL			✗		✗		73K221L with serial interface only	+5V	22 DIP
SSI 73K222	✗		✗		✗		Bell 212A/103, CCITT V.22/V.21	+12V	22, 28 DIP, 28 PLC
SSI 73K222S	✗		✗		✗		73K222 with serial interface only	+12V	22 DIP
SSI 73K222L	✗		✗		✗		Low Power 73K222	+5V	22, 28 DIP, 28 PLCC
SSI 73K222SL	✗		✗		✗		73K222L with serial interface only	+5V	22 DIP
SSI 73K222U	✗		✗		✗		73K222L with 16C450 UART	+5V	40 DIP, 44 PLCC
SSI 73K224L	✗		✗		✗	✗	Bell 212A/103, CCITT V.22bis/V.22/V.21	+5V	28 DIP, 28, 32 PLCC, 52 QFP, 64 TQFP
SSI 73K224SL	✗		✗		✗	✗	73K224L with serial interface	+5V	22 DIP
SSI 73K302L	✗	✗					Bell 212A/202/103	+5V	28 DIP, 28 PLCC
SSI 73K302SL	✗	✗					Bell 212A/202/103; serial interface only	+5V	22 DIP
SSI 73K312L	B103	✗	✗	✗			BELL 202/103; CCITT V.21/V.23	+5V	28 DIP, 28 PLCC, 52 QFP, 64 TQFP
SSI 73K321L			✗	✗			CCITT V.23/V.21	+5V	28 DIP, 28 PLCC
SSI 73K321SL			✗	✗			73K321L with serial interface only	+5V	22 DIP
SSI 73K322L			✗	✗	✗		CCITT V.23/V.22/V.21	+5V	28 DIP, 28 PLCC
SSI 73K322SL			✗	✗	✗		73K322L with serial interface only	+5V	22 DIP
SSI 73K324L	B212		✗	✗	✗	✗	CCITT V.22bis/V.22/V.23/V.21	+5V	28 DIP, 28, 32 PLCC 52 QFP, 64 TQFP
MODEM PROTOCOL PRODUCTS/ DEVICE SETS									
SSI 73D2240	✗	✗	✗			✗	Modem Device Set w/ AT (73K224L based design)	+5V	Various DIP & PLCC
SSI 73D2247/Z	✗	✗	✗		✗	✗	Modem Device Set w/ AT, MNP 4&5	+5V	Various DIP & PLCC
SSI 73D2248/2348	2248		2348	✗	✗	✗	Modem Device Set w/ AT, MNP	+5V	Various QFP & TQFP

Device Number	Circuit Function	Features	Power	Available Packages
BUS INTERFACE PRODUCTS				
SSI 73M550	16C550 pin compatible UART	Receive and Transmit FIFOs	+5V	40 DIP, 44 PLCC, 48 GT
SSI 73M650	Serial Packet Controller	Multi-function Sync/Async communication IC	+5V	40 DIP, 44 PLCC, 64 GT
SSI 73M1550	28-pin version of 73M550	Full UART in 28-pin package	+5V	28 DIP, PLCC
SSI 73M1650	28-pin version of 73M650	SPC in 28-pin package	+5V	28 DIP, PLCC
SSI 73M2550	28-pin version of 73M550	Adds µPRST function	+5V	28 DIP, PLCC

ANALOG SIGNALLING AND SWITCHING PRODUCTS				
SSI 75T201	Integrated DTMF Receiver	Binary coded 2-of-8 output	+12V	22 DIP
SSI 75T202	Integrated DTMF Receiver	Low power, binary output	+5V	18 DIP
SSI 75T203	Integrated DTMF Receiver	Early detect, binary output	+5V	18 DIP
SSI 75T204	Integrated DTMF Receiver	Low power, binary output	+5V	14 DIP, 16 SO
SSI 75T2089	Integrated DTMF Transceiver	Generator & receiver, µP interface	+5V	22 DIP
SSI 75T2090	Integrated DTMF Transceiver	Like 75T2089 w/ call progress detect	+5V	22 DIP
SSI 75T2091	Integrated DTMF Transceiver	Like 75T2090 w/ early detect	+5V	28 DIP, PLCC
SSI 75T980	Imprecise Call Progress Detector	Energy detect in 305-640 Hz band, Teltone	+5V	8 DIP
SSI 78A093A/B	12x8x1 Crosspoint Switch	Low ON resistance, two versions	+5, +12V	40 DIP, 44 PLCC
SSI 78A207	Integrated MF Receiver	Detects central office toll signals	+5V	20 DIP
PCM PRODUCTS				
SSI 78P233	DS-1 Line Interface	T1 clock & data recovery, transmit equalization	+5V	24 DIP, SDIP, SO
SSI 78P234	2048 kBit/s PCM Interface	Receive clock & data recovery, transmit drivers	+5V	20 DIP, SO
SSI 78P236	DS-3 Line Interface	T3 clock & data recovery, transmit equalization	+5V	28 DIP
SSI 78P300	T1/E1 Short Haul Transceiver	Receive jitter attenuation	+5V	28 DIP, PLCC
SSI 78P304A	Low-Power 38P300	Receive jitter attenuation	+5V	28 DIP, PLCC
SSI 78P2361	STS-1 Line Interface Transceiver	STS-1 clock & data recovery, transmit equalization	+5V	28 DIP
SSI 78P2362	CEPT E-3 Line Interface Transceiver	E3 clock & data recovery, transmit equalization	+5V	28 DIP
SSI 78P7200	DS-3 Line Interface Transceiver	DS-3 Transceiver w/Receive equalization & higher transmitter drive	+5V	28 DIP
LAN PRODUCTS				
SSI 78Q902	10Base-T MAU Transceiver	Direct interface to twisted pair and AUI	+5V	28 DIP, PLCC
SSI 78Q903	10Base-T Hub Transceiver	Programmable squelch, detect/correct reverse polarity	+5V	24 DIP, 28 PLCC
SSI 78Q8330	802.3 Coax Transceiver	10Base-2 applications	+9V	20 DIP, PLCC, 64 TQFP
SSI 78Q8330A	802.3 Coax Transceiver	10Base-2/10Base-5 applications	+9V	20 DIP, PLCC, 64 TQFP
SSI 78Q8360	Ethernet Controller/ENDEC Combo	Fully integrated MAC ENDEC & AUI	+5V	100 QFP, TQFP
SPECIAL MODEM PRODUCTS				
SSI 73M214	2400 bit/s Modem Filter	V.22bis/V.22/V.21, Bell 212/103 modes	±5V	28 DIP, PLCC
SSI 73M223	1200 bit/s Modem IC	Compact HDX V.23 modem	+5V	16 DIP, 16 SOL
SSI 73M376	Integrated Line Interface	The active components of a DAA in a chip used on 73M9001	+5V	28 PLCC, 24 VSOP

Automotive Products Selector Guide

Device Number	Circuit Function	Features	Power	Available Packages
AUTOMOTIVE PRODUCTS				
SSI 67F687	Engine Interface Peripheral	Ignition timing and fuel injection control	+5V	68 PLCC
SSI 67F6612	Ignition Predriver	External power transistor driver, 2, 3, and 4 channels	+5V	14 SOL, 16 SOL, 20 SOL, 20 VSOP

SIMTEK

STK12C68
CMOS nvSRAM
8K x 8 High Performance
AutoStore™ Nonvolatile Static RAM

FEATURES

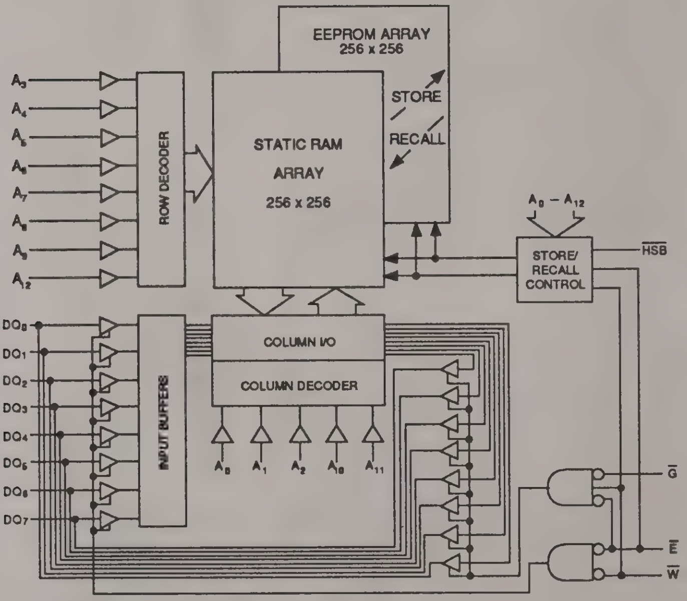
- **30, 35 and 45ns Access Times**
- **15 mA I_{CC} at 200ns Access Speed**
- **Automatic *STORE* to EEPROM on Power Down**
- **Hardware or Software Initiated *STORE* to EEPROM**
- **Automatic *STORE* Timing**
- **10^4 or 10^5 *STORE* cycles to EEPROM**
- **10 year data retention in EEPROM**
- **Automatic *RECALL* on Power Up**
- **Software Initiated *RECALL* from EEPROM**
- **Unlimited *RECALL* cycles from EEPROM**
- **Single 5V±10% Operation**
- **Commercial and Industrial Temperatures**
- **Available in multiple standard packages**

DESCRIPTION

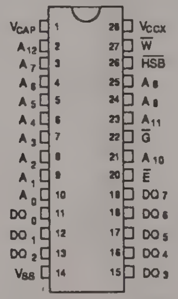
The Simtek STK12C68 is a fast static RAM (30, 35 and 45ns), with a nonvolatile EEPROM element incorporated in each static memory cell. The SRAM can be read and written an unlimited number of times, while independent nonvolatile data resides in EEPROM. Data transfers from the SRAM to the EEPROM (the *STORE* operation) take place automatically upon power down using charge stored in an inexpensive 100 µF electrolytic capacitor. Transfers from the EEPROM to the SRAM (the *RECALL* operation) take place automatically on power up. Software sequences may also be used to initiate both *STORE* and *RECALL* operations. A *STORE* can also be initiated via a single pin.

The STK12C68 is available in the following packages: a 28-pin 300 mil plastic DIP, a 28-pin 600 mil plastic DIP and a 28-pin SOIC. Military versions are also planned.

LOGIC BLOCK DIAGRAM


EEPROM ARRAY
256 x 256
STORE
RECALL
STATIC RAM
ARRAY
256 x 256
ROW DECODER
A3
A4
A5
A6
A7
A8
A9
A2
A0 – A12
STORE/
RECALL
CONTROL
HSB
DQ0
DQ1
DQ2
DQ3
DQ4
DQ5
DQ6
DQ7
INPUT BUFFERS
COLUMN I/O
COLUMN DECODER
A0
A1
A2
A10
A11
G
E
W

PIN CONFIGURATIONS


VCAP 1
A12 2
A7 3
A6 4
A5 5
A4 6
A3 7
A2 8
A1 9
A0 10
DQ0 11
DQ1 12
DQ2 13
VSS 14
28 VCCX
27 W
26 HSB
25 A8
24 A9
23 A11
22 G
21 A10
20 E
19 DQ7
18 DQ6
17 DQ5
16 DQ4
15 DQ3

28 - 600 PDIP 28 - 350 SOIC
28 - 300 PDIP

PIN NAMES

A_0 - A_{12}	Address Inputs
$\overline{W}$	Write Enable
DQ_0 - DQ_7	Data In/Out
$\overline{E}$	Chip Enable
$\overline{G}$	Output Enable
V_{CCX}	Power (+5V)
V_{SS}	Ground
V_{CAP}	Capacitor
$\overline{HSB}$	Hardware Store/Busy

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SIMTEK

STK12C88

32K x 8 *AutoStore*™ nvSRAM
High Performance CMOS
Nonvolatile Static RAM

ADVANCE

FEATURES

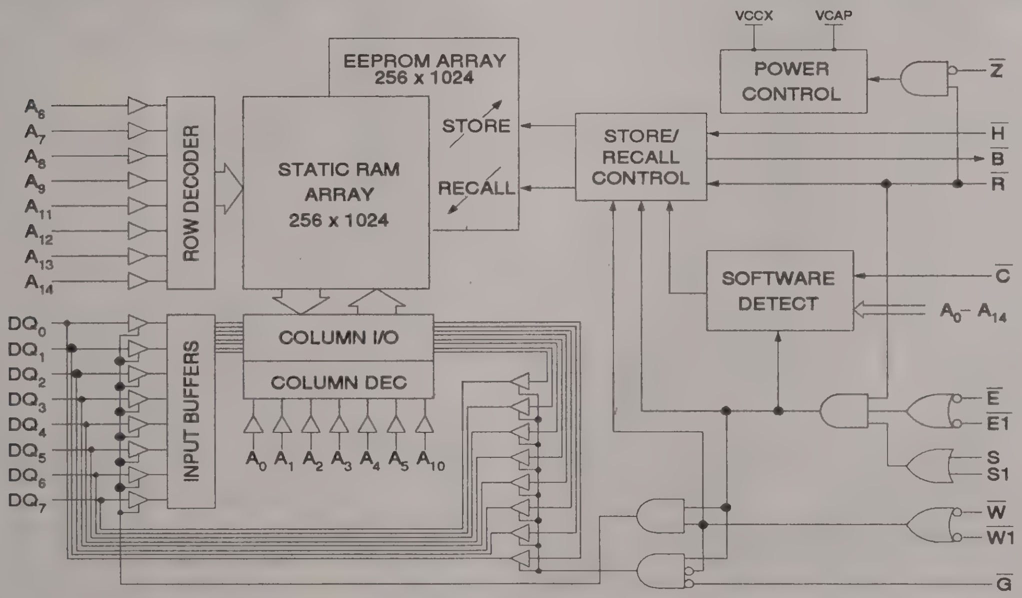
- **25ns and 30ns Access Times**
- **12ns and 15ns Output Enable Times**
- **Store to EEPROM Initiated by Hardware, Software or *AutoStore* on Power Down**
- **Recall to SRAM Initiated by Hardware, Software or Power Restore**
- **Low Power Sleep Mode: $I_{CC} < 20\mu A$**
- **15mA I_{CC} at 200ns Cycle Time**
- **Separate Strobe Input for Software Control**
- **Multiple Select and Enable Pins for Flexible Interface to Processors**
- **Unlimited Recalls from EEPROM to SRAM**
- **10^5 Store Cycles to EEPROM**
- **10 Year Data Retention in EEPROM**
- **Commercial and Industrial Temp. Range**
- **64 Pin PQFP and 40 Pin 600 mil PDIP Packages**

DESCRIPTION

The Simtek STK12C88 is a fast static RAM (25 and 30ns) with a nonvolatile, electrically-erasable PROM (EEPROM) element incorporated in each static memory cell. The SRAM can be read and written an unlimited number of times, while independent nonvolatile data resides in EEPROM. Data transfers from the SRAM to the EEPROM (the *STORE* operation) can take place automatically on power down using charge stored in an external capacitor. Transfers from the EEPROM to the SRAM (the *RECALL* operation) take place automatically on restoration of power. Initiation of STORE and RECALL cycles can also be controlled by separate input pins or by entering specific command sequences.

Military versions are also planned.

LOGIC BLOCK DIAGRAM


VCCX
VCAP
EEPROM ARRAY 256 x 1024
POWER CONTROL
$\overline{Z}$
STORE
RECALL
STORE/ RECALL CONTROL
$\overline{H}$
$\overline{B}$
$\overline{R}$
STATIC RAM ARRAY 256 x 1024
ROW DECODER
A_6
A_7
A_8
A_9
A_{11}
A_{12}
A_{13}
A_{14}
SOFTWARE DETECT
$\overline{C}$
A_0 – A_{14}
DQ_0
DQ_1
DQ_2
DQ_3
DQ_4
DQ_5
DQ_6
DQ_7
INPUT BUFFERS
COLUMN I/O
COLUMN DEC
A_0 A_1 A_2 A_3 A_4 A_5 A_{10}
$\overline{E}$
E1
S
S1
$\overline{W}$
W1
$\overline{G}$

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SIMTEK

STK1390
nvTiME™
8K x 8 Nonvolatile Static RAM with Real Time Clock

PRELIMINARY

FEATURES

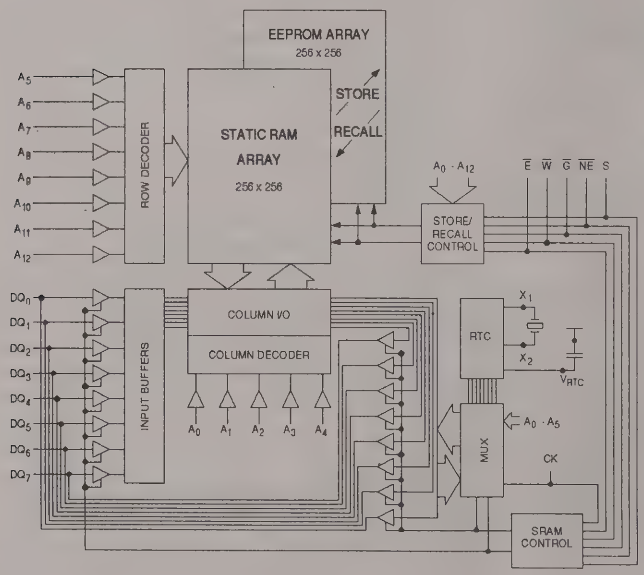
- **Solid-state nonvolatile SRAM/RTC solution - no batteries required**
- **Ideal for metering applications**
- **25, 30, 35 and 45 ns SRAM read/write access**
- **Unlimited read/write cycles to SRAM**
- **NOVCEL™ technology - true nonvolatile RAM**
- **Software and hardware controlled nonvolatile cycles**
- **10 year data retention from each store cycle**
- **Full-featured Real Time Clock on-chip**
- **RTC operates from external capacitor - typical 1 month operation from 0.47F supercap**
- **Uses standard 32.768kHz Watch Crystal**
- **Commercial and industrial temperatures**
- **600 mil 32-pin DIP or 400 mil SOIC package**

DESCRIPTION

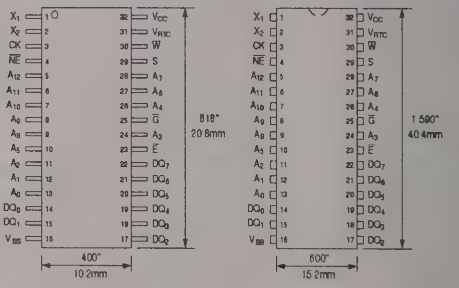
The Simtek STK1390 contains both an 8K fast static RAM with nonvolatile EEPROM shadow and a monolithic real time clock. The SRAM can be read and written an unlimited number of times while independent nonvolatile data resides in EEPROM. The RTC information consists of an additional 64 8-bit registers. The lower 12 registers are used for time and configuration information. The upper 52 registers are available for user information and are shadowed by EEPROM with each STORE cycle. The RTC registers are accessible through the SRAM I/O pins.

The STK1390 supports long-term, unpowered operation of the RTC from a capacitor. This eliminates the need for batteries without the need for complex alternate power sources.

LOGIC BLOCK DIAGRAM


EEPROM ARRAY
256 x 256
STORE
RECALL
STATIC RAM
ARRAY
256 x 256
ROW DECODER
A5
A6
A7
A8
A9
A10
A11
A12
A0 - A12
E W G NE S
STORE/
RECALL
CONTROL
DQ0
DQ1
DQ2
DQ3
DQ4
DQ5
DQ6
DQ7
INPUT BUFFERS
COLUMN I/O
COLUMN DECODER
A0
A1
A2
A3
A4
RTC
X1
X2
VRTC
A0 - A5
MUX
CK
SRAM
CONTROL

PINOUTS AND PACKAGES


X1 1
X2 2
CK 3
NE 4
A12 5
A11 6
A10 7
A9 8
A8 9
A5 10
A2 11
A1 12
A0 13
DQ0 14
DQ1 15
VSS 16
32 VCC
31 VRTC
30 W
29 S
28 A7
27 A6
26 A4
25 G
24 A3
23 E
22 DQ7
21 DQ6
20 DQ5
19 DQ4
18 DQ3
17 DQ2
.818"
20.8mm
.400"
10.2mm
1.590"
40.4mm
.600"
15.2mm

A_0 - A_{12}	Address Inputs
$\overline{W}$	Write Enable
DQ_0 - DQ_7	Data In/Out
$\overline{E}$	Chip Enable
S	Chip Select
$\overline{NE}$	Nonvolatile Enable
$\overline{G}$	Output Enable
CK	RTC Control
V_{CC}	Power (+5)
V_{SS}	Ground
V_{RTC}	Capacitor Input

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SIMTEK

STK10C68 / STK11C68
STK10C48 / STK11C48
CMOS nvSRAM
High Performance
Nonvolatile Static RAM

FEATURES

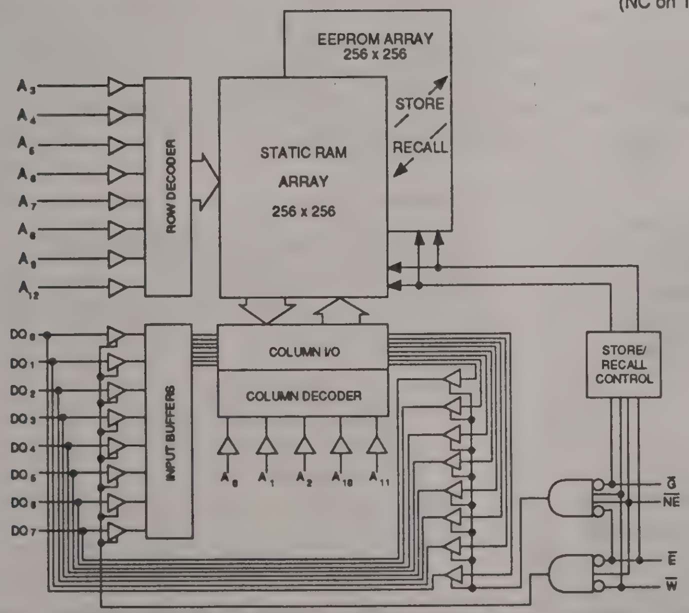
- **25, 30, 35 and 45ns Access Times**
- **12, 15, 20 and 25ns Output Enable Access**
- **Unlimited Read and Write to SRAM**
- **Hardware or Software *STORE* Initiation**
- **Automatic *STORE* Timing**
- **10^4 or 10^5 *STORE* cycles to EEPROM**
- **10 year data retention in EEPROM**
- **Automatic *RECALL* on Power Up**
- **Hardware or Software *RECALL* Initiation**
- **Unlimited *RECALL* cycles from EEPROM**
- **Single 5V±10% Operation**
- **Commercial, Industrial and Military Temperatures**
- **Available in multiple standard packages**

DESCRIPTION

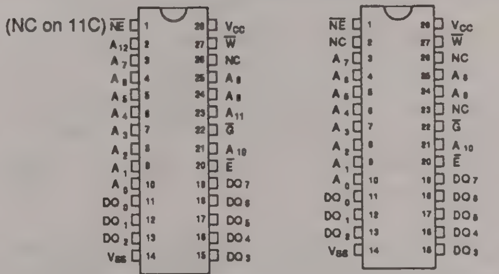
Simtek's STK10C68, STK10C48, STK11C68 and STK11C48 nvSRAMs are fast static RAMs, with a nonvolatile electrically-erasable PROM (EEPROM) element incorporated in each static memory cell. The SRAM can be read and written an unlimited number of times, while independent nonvolatile data resides in EEPROM. Data may easily be transferred from the SRAM to the EEPROM (*STORE*), or from the EEPROM to the SRAM (*RECALL*). It combines the high performance and ease of use of a fast SRAM with nonvolatile data integrity.

The STK10C and STK11C feature industry standard pinouts for nonvolatile RAMs in 28-pin 300 mil plastic DIP, 28-pin 300 mil ceramic DIP, 28 pad LCC, and a 28-pin SOIC package. MIL-STD-883 and Standard Military Drawing devices are available for the STK10C68 and STK11C68 versions.

LOGIC BLOCK DIAGRAM


EEPROM ARRAY
256 x 256
STORE
RECALL
STATIC RAM
ARRAY
256 x 256
ROW DECODER
A3
A4
A5
A6
A7
A8
A9
A12
COLUMN I/O
COLUMN DECODER
INPUT BUFFERS
DQ0
DQ1
DQ2
DQ3
DQ4
DQ5
DQ6
DQ7
A0
A1
A2
A10
A11
STORE/
RECALL
CONTROL
G
NE
E
W

PIN CONFIGURATIONS


(NC on 11C) NE 1
A12 2
A7 3
A6 4
A5 5
A4 6
A3 7
A2 8
A1 9
A0 10
DQ0 11
DQ1 12
DQ2 13
Vss 14
28 Vcc
27 W
26 NC
25 A8
24 A9
23 A11
22 G
21 A10
20 E
19 DQ7
18 DQ6
17 DQ5
16 DQ4
15 DQ3
NE 1
NC 2
A7 3
A6 4
A5 5
A4 6
A3 7
A2 8
A1 9
A0 10
DQ0 11
DQ1 12
DQ2 13
Vss 14
28 Vcc
27 W
26 NC
25 A8
24 A9
23 NC
22 G
21 A10
20 E
19 DQ7
18 DQ6
17 DQ5
16 DQ4
15 DQ3

STK10C68/STK11C68
28 - 300 P-DIP
28 - 350 SOIC

STK10C48/STK11C48
28 - 350 SOIC
28 - 300 PDIP
28 - 600 PDIP

PIN NAMES

A_0 - A_{12}	Address Inputs
$\overline{W}$	Write Enable
DQ_0 - DQ_7	Data In/Out
$\overline{E}$	Chip Enable
$\overline{G}$	Output Enable
$\overline{NE}$	Nonvolatile Enable (STK10C)
V_{CC}	Power (+5V)
V_{SS}	Ground

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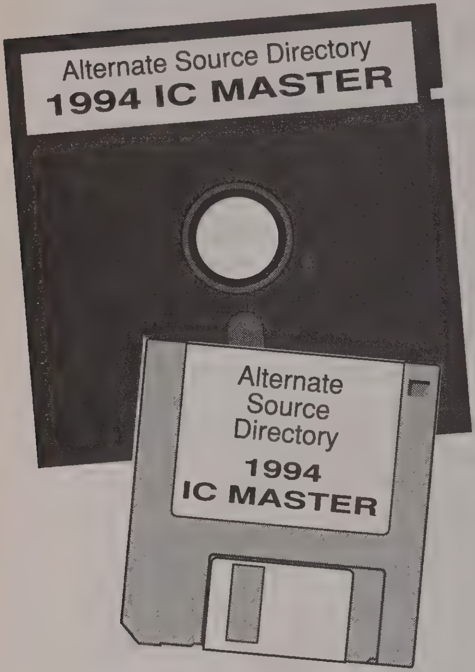
ALTERNATE SOURCE DIRECTORY



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Published annually in March

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SONY® CXK584000TM/YM/M/P -55L/70L/10L -55LL/70LL/10LL

524288-word × 8-bit High Speed CMOS Static RAM

Description

CXK584000TM/YM/M/P is a 4,194,304 bits high speed CMOS static RAM organized as 524,288-word by 8-bit. Polysilicon TFT cell technology realized extremely low stand-by current and higher data retention stability. Operating on a single 3.0 to 5.5V supply, this asynchronous IC is suitable for high speed and low power consumption applications where battery back up for nonvolatility is required.

Features

- Wide supply voltage range: 3.0 to 5.5V
- Fast access time:

	5V operation/3.3V operation
-55L/55LL	55ns/100ns (Max.)
-70L/70LL	70ns/120ns (Max.)
-10L/10LL	100ns/150ns (Max.)

- Low stand-by current:

-55L/70L/10L	100 μA (Max.)
-55LL/70LL/10LL	50 μA (Max.)

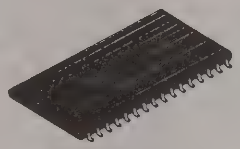
- Low data retention current:

-55L/70L/10L	15 μA (Max.) Ta=0 to +40 ℃
-55LL/70LL/10LL	3 μA (Max.) Ta=0 to +40 ℃

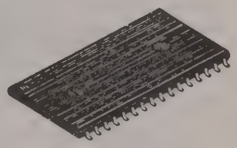
- Low voltage data retention: 2.0V (Min.)
- Package line-up

CXK584000TM/YM	400mil 32 pin TSOP (Type II)
CXK584000M	525mil 32 pin SOP
CXK584000P	600mil 32 pin DIP

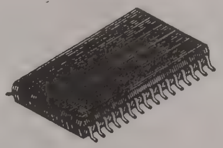
CXK584000TM
32 pin TSOP (Plastic)



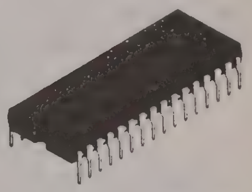
CXK584000YM
32 pin TSOP (Plastic)



CXK584000M
32 pin SOP (Plastic)



CXK584000P
32 pin DIP (Plastic)



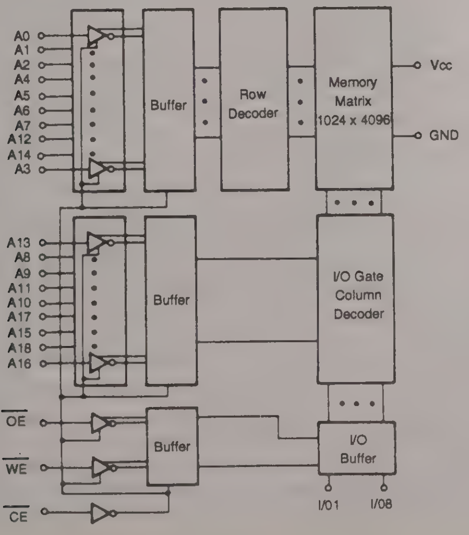
Function

524288-word × 8-bit static RAM

Structure

Silicon gate CMOS IC

Block Diagram


A0
A1
A2
A4
A5
A6
A7
A12
A14
A3
Buffer
Row Decoder
Memory Matrix 1024 x 4096
Vcc
GND
A13
A8
A9
A11
A10
A17
A15
A18
A16
Buffer
I/O Gate Column Decoder
OE
WE
CE
Buffer
I/O Buffer
I/01
I/08

Sony Electronics Inc. - 10833 Valley View Street - Cypress, CA 90630
Phone 800/288-Sony - Fax 714/229-4333

SONY. CXK581000ATM/AYM/AM/AP -55LL/70LL/10LL -55SL/70SL/10SL

131072-word × 8-bit High Speed CMOS Static RAM

Description

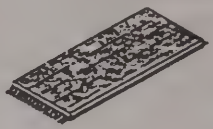
The CXK581000ATM/AYM/AM/AP is a high speed CMOS static RAM organized as 131072-words by 8 bits.

A polysilicon TFT cell technology realized extremely low stand-by current and higher data retention stability.

Special feature are low power consumption, high speed and broad package line-up.

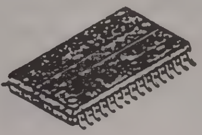
The CXK581000ATM/AYM/AM/AP is a suitable RAM for portable equipment with battery back up.

CXK581000ATM
32 pin TSOP (Plastic)

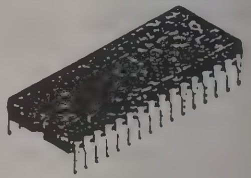


CXK581000AYM
32 pin TSOP (Plastic)

CXK581000AM
32 pin SOP (Plastic)



CXK581000AP
32 pin DIP (Plastic)



Features

- Fast access time:
  CXK581000ATM/AYM/AM/AP (Access time)
  –55LL/55SL, 55ns (Max.)
  –70LL/70SL, 70ns (Max.)
  –10LL/10SL, 100ns (Max.)
- Low standby current:
  CXK581000ATM/AYM/AM/AP
  –55LL/70LL/10LL, 20 µA (Max.)
  –55SL/70SL/10SL, 12 µA (Max.)
- Low data retention current
  CXK581000ATM/AYM/AM/AP
  –55LL/70LL/10LL, 12 µA (Max.)
  –55SL/70SL/10SL, 4 µA (Max.)
- Single +5V supply: +5V ± 10%
- Low voltage data retention: 2.0V (Min.)
- Broad package line-up
  CXK581000ATM/AYM
  8mm × 20mm 32 pin TSOP package
  CXK581000AM 525mil 32 pin SOP package
  CXK581000AP 600mil 32 pin DIP package

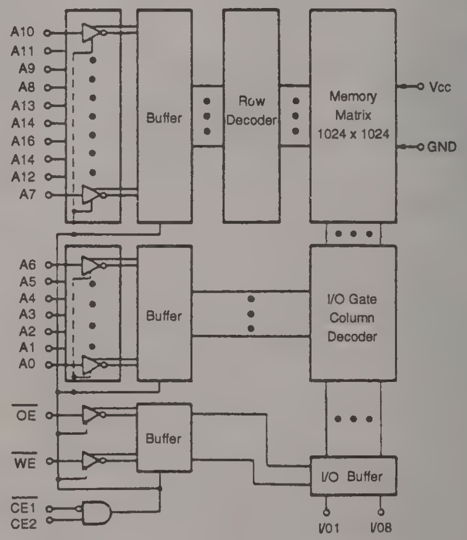
Functions

131072-word × 8-bit static RAM

Structure

Silicon gate CMOS IC

Block Diagram


A10
A11
A9
A8
A13
A14
A16
A14
A12
A7
Buffer
Row Decoder
Memory Matrix 1024 x 1024
Vcc
GND
A6
A5
A4
A3
A2
A1
A0
Buffer
I/O Gate Column Decoder
OE
WE
Buffer
I/O Buffer
CE1
CE2
I/01
I/08

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SONY®

CXK77410J -10/12/15

262,144 word by 4-bit High Speed CMOS Synchronous Static RAM *Preliminary*

Description

The CXK77410J is a high speed CMOS synchronous static RAM with separate I/O pins, organized as 262,144-words by 4-bits. This synchronous SRAM integrates input registers, high speed SRAM and output registers onto a single monolithic IC. All input signals are latched at the positive edge of an external clock (CLK). The RAM data from the previous cycle is presented at the positive edge of the subsequent clock cycle. Write operation is initiated by the positive edge of CLK and is internally selftimed. This feature eliminates complex off-chip write pulse generation and provides increased flexibility for incoming signals. Pass-thru capability is also provided. 100MHz operation is obtained from a single 5V power supply.

Function

There are three possible user capabilities with this chip: Read operation, Write operation, and Pass-through operation.

- The read operation requires $\overline{WE}$= "HIGH" at the rising edge of CLK. The memory location specified by the address inputs is latched and read internally. At the subsequent rising edge of CLK, if $\overline{OE}$= "LOW", the contents of the previous cycle are captured by the Data-out registers. The state of the output terminals reflect the contents of the Data-out registers.
- The write and pass-through operations require $\overline{WE}$ and $\overline{WEI}$ to be "LOW" at the rising edge of CLK. The contents of the Data-in registers are written into the memory locations specified by the address inputs.

  The write operation is entirely self-timed. The contents of the Data-in registers are also captured by the Data-out registers when $\overline{OE}$ goes "LOW" at the subsequent rising edge of CLK and are also passed to the output terminals for write through operation.
- The pass through operation requires $\overline{WE}$= "LOW" and $\overline{WEI}$= "HIGH" at the rising edge of CLK. The data is not written to memory, however the contents of Data-in registers are captured by the Data-out registers when $\overline{OE}$= "LOW" at the subsequent rising edge of CLK. It is also presented to the output terminals.

  Wait states are not required between read and write cycles.

  The FOM pin is used to control output timing, allowing the user to skew CLK to output and hold times.

36 pin SOJ (Plastic)

Structure

Silicon gate CMOS IC

Features

- Fast Cycle Time:

	(Cycle)	(Frequency)
CXK77410J-10	10.0ns	100MHz
CXK77410J-12	12.5ns	80MHz
CXK77410J-15	15.0ns	66.7MHz

- High speed, low power consumption
- Single +5V power supply: 5V ± 5%
- Inputs and outputs are TTL compatible
- Write-through capability
- Separate data input and output
- 10ns cycle time (100MHz)
- All inputs and outputs are registered on a single clock edge
- Self-timed write cycle
- Arbitrary consecutive read/write cycles with no write recovery cycles
- Available in a 36pin 50mil lead pitch 400mil SOJ package

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SONY®

CXK77910J -17/20

131072 words × 9-bit Self-Timed Static Random Access Memory

Preliminary

Description

The CXK77910J is a 1,179,648 bit Self-Timed Static Random Access Memory organized as 128K words by 9 bits. This STRAM integrates Input Registers, High Speed SRAM and Output Registers onto a single monolithic circuit. All Registers are triggered with the positive edge of an external clock (CLK). At the positive edge of CLK, the RAM data of the previous CLK cycle is presented. Write operation is initiated by the positive edge of CLK and internally self-timed. This feature eliminates complex off-chip write pulse generation and provides increased flexibility for incoming signals.

Function

There are three possible user transactions with the STRAM. (Read operation, write operation and deselect operation.)

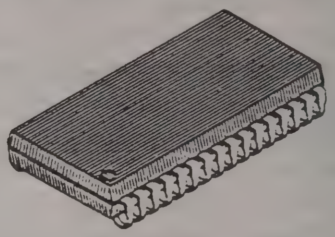
The read operation requires $\overline{WE}$="HIGH" and $\overline{OE}$=$\overline{CE}$="low" on the positive edge of CLK.
The memory location pointed to by the contents of the Address registers is read internally and the contents of the location are captured in the Data-out registers on the next positive edge of CLK. The state of Data-out will reflect the contents of the Data-out registers.

The write operation requires $\overline{CE}$=$\overline{WE}$="LOW" on the positive edge of CLK. The memory location pointed to by the contents of the Address registers is written with the contents of the Data-in registers. The write operation is entirely self-timed, eliminating critical timing edges.

The deselect cycle requires $\overline{CE}$="HIGH" or $\overline{OE}$=$\overline{WE}$="HIGH" on the positive edge of CLK. Write operation and internal read operation are disabled during the clock cycle. The data outputs are forced to a high impedance state during the next clock cycle. During the deselect cycle by $\overline{CE}$="HIGH", STRAM turns to power down mode.

The write cycle needs three preceding deselect cycles since the data for the write cycle must be supplied to I/O terminals during high impedance state. But immediately after power-on of the STRAM, the write operation can start on the first positive edge of CLK since the I/O terminals are initialized to be in high-impedance state.

32 pin SOJ (Plastic)



Features

- Fast Cycle Time:

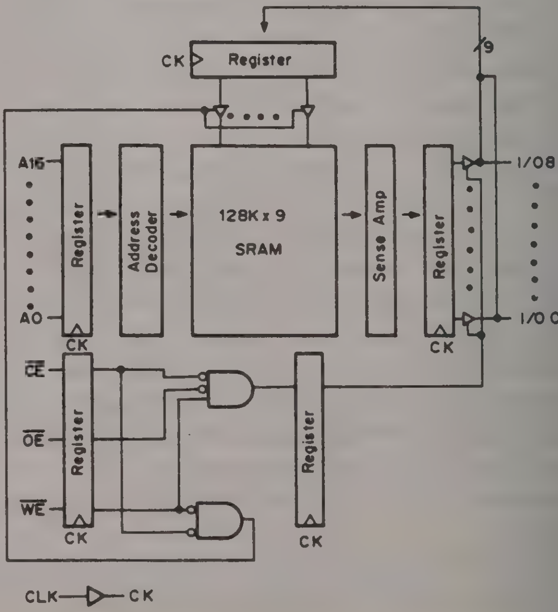
	(Cycle)	(Frequency)
CXK77910J-17	16.6ns	60MHz
CXK77910J-20	20.0ns	50MHz

- Fast Clock to Data Valid
  CXK77910J-17/20 10ns
- Available in Plastic 32 pin 400mil SOJ
- All inputs and outputs registered with clock
- Direct TTL compatible
- Low power consumption (min. cycle, 100% duty)
  CXK77910J-17/20 715mW (Max.)

Structure

Silicon gate CMOS IC

Block Diagram



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SONY

CXK58257ATM/AYM -12LB

32768-word × 8-bit High Speed CMOS Static RAM

Description

CXK58257ATM/AYM is a 256K bits, 32768 words by 8 bits, CMOS static RAM. Operating on a single 2.7 to 5.5V supply. It is suitable for portable and battery back-up systems which require extremely small package and low stand-by current.

CXK58257ATM
28 pin TSOP (Plastic)

CXK58257AYM
28 pin TSOP (Plastic)

Features

- Wide supply voltage range operation: 2.7 to 5.5V
- Thin small-outline package:
  CXK58257ATM: 8mm × 13.4mm 28 pin TSOP
  CXK58257AYM: 8mm × 13.4mm 28 pin TSOP
  (Mirror image pinout)
- Fast access time: (Access time)
  3V ± 10% operation; 240ns (Max.)
  5V ± 10% operation; 120ns (Max.)
- Low power consumption operation:
  Standby / DC operation
  3V operation; 0.75 µW (Typ.) / 1.2mW (Typ.)
  5V operation; 2.5 µW (Typ.) / 15mW (Typ.)
- Fully static memory…No clock or timing strobe required.
- Equal access and cycle time
- Common data input and output: three state output
- Directly TTL compatible: All inputs and outputs
- Low voltage data retention: 2.0V (Min.)

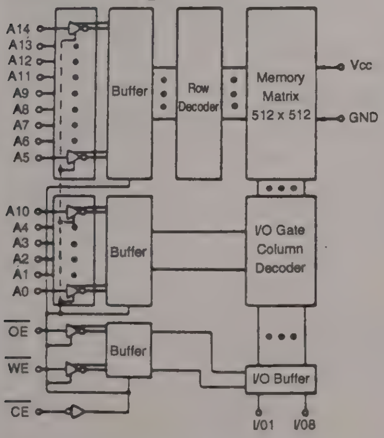
Function

32768-word × 8-bit static RAM

Structure

Silicon gate CMOS IC

Block Diagram

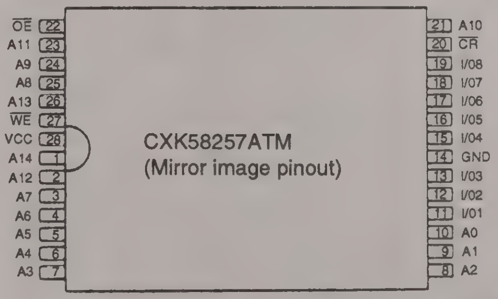

A14
A13
A12
A11
A9
A8
A7
A6
A5
Buffer
Row Decoder
Memory Matrix 512 x 512
Vcc
GND
A10
A4
A3
A2
A1
A0
Buffer
I/O Gate Column Decoder
OE
WE
Buffer
I/O Buffer
CE
I/O1
I/O8

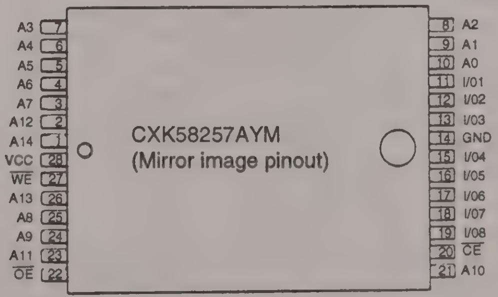
Pin Description

Symbol	Description
A0 to A14	Address input
I/O1 to I/O8	Data input/output
$\overline{CE}$	Chip enable input
$\overline{WE}$	Write enable input
$\overline{OE}$	Output enable input
Vcc	2.7 to 5.5V power supply
GND	Ground

Pin Configuration

(Top View)


OE 22
A11 23
A9 24
A8 25
A13 26
WE 27
VCC 28
A14 1
A12 2
A7 3
A6 4
A5 5
A4 6
A3 7
21 A10
20 CR
19 I/08
18 I/07
17 I/06
16 I/05
15 I/04
14 GND
13 I/03
12 I/02
11 I/01
10 A0
9 A1
8 A2
CXK58257ATM
(Mirror image pinout)


A3 7
A4 6
A5 5
A6 4
A7 3
A12 2
A14 1
VCC 28
WE 27
A13 26
A8 25
A9 24
A11 23
OE 22
8 A2
9 A1
10 A0
11 I/01
12 I/02
13 I/03
14 GND
15 I/04
16 I/05
17 I/06
18 I/07
19 I/08
20 CE
21 A10
CXK58257AYM
(Mirror image pinout)

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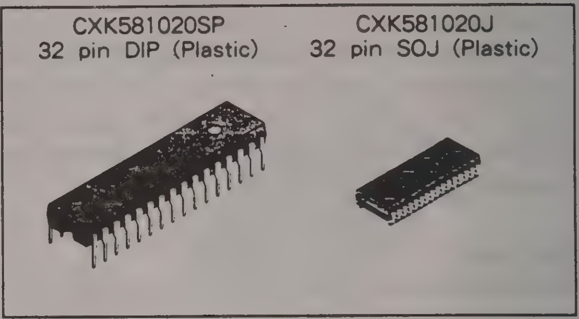
SONY® CXK581020SP/J -35/45/55

131072-word × 8-bit High Speed CMOS Static RAM

Description

CXK581020SP/J are 131,072-word × 8-bit high speed CMOS static RAMs suitable for use in high speed and low power applications.

Organized as 131,072 words by 8 bits, it operates from a single 5V supply.


CXK581020SP
32 pin DIP (Plastic)

CXK581020J
32 pin SOJ (Plastic)

Features

- Fast access time : (Access time)
  CXK581020SP/J-35 35ns (Max.)
  CXK581020SP/J-45 45ns (Max.)
  CXK581020SP/J-55 55ns (Max.)
- Low power operation : (Standby) (Operation)
  CXK581020SP/J-35, 45, 55
  50 μW(Typ.) 150mW(Typ.)
- Single +5V supply : +5V ± 10%
- Fully static memory ··· No clock or timing strobe required.
- Equal access and cycle time.
- Directly TTL compatible : All inputs and outputs.
- Available in 32 pin 400-mil DIP and 400-mil SOJ

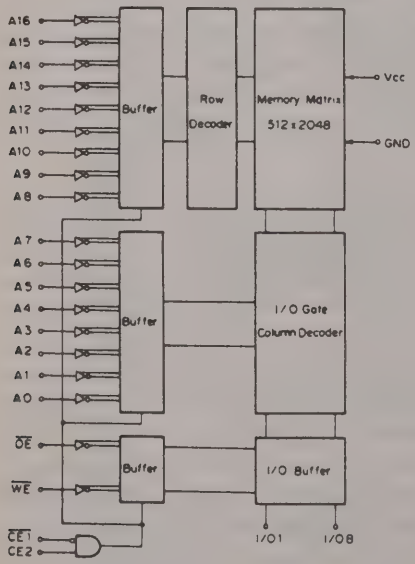
Function

131,072-word × 8-bit static RAM

Structure

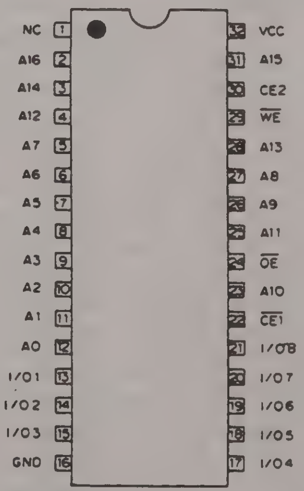
Silicon gate CMOS IC

Block Diagram


A16
A15
A14
A13
A12
A11
A10
A9
A8
Buffer
Row Decoder
Memory Matrix 512×2048
Vcc
GND
A7
A6
A5
A4
A3
A2
A1
A0
Buffer
I/O Gate Column Decoder
$\overline{OE}$
$\overline{WE}$
Buffer
I/O Buffer
$\overline{CE1}$
CE2
I/O1
I/O8

Pin Configuration

(Top View)


NC 1
A16 2
A14 3
A12 4
A7 5
A6 6
A5 7
A4 8
A3 9
A2 10
A1 11
A0 12
I/O1 13
I/O2 14
I/O3 15
GND 16
32 VCC
31 A15
30 CE2
29 $\overline{WE}$
28 A13
27 A8
26 A9
25 A11
24 $\overline{OE}$
23 A10
22 $\overline{CE1}$
21 I/O8
20 I/O7
19 I/O6
18 I/O5
17 I/O4

Pin Description

Symbol	Description
A0 to A16	Address input
I/O1 to I/O8	Data input output
$\overline{CE1}$, CE2	Chip enable 1, 2 input
$\overline{WE}$	Write enable input
$\overline{OE}$	Output enable input
Vcc	+5V Power supply
GND	Ground
NC	No connection

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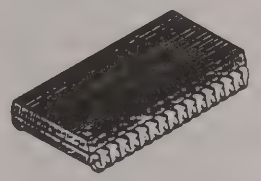
SONY® CXK581120J - 15/17/20

131,072-WORDS X 8-BITS HIGH SPEED CMOS STATIC RAM PRELIMINARY

Description

The CXK581120J is a high speed 1M-bit CMOS static RAM organized as 131 072-words X 8-bits. It operates at 15/17/20ns access time from a single 5V power supply, utilizing center-ground/power pin architecture.

CXK581120J
32 PIN SOJ
(PLASTIC)



Function

131,072-words X 8-bits static RAM

Structure

Silicon gate CMOS IC

Features

- High speed, low power consumption:

	Access time (Max.)	Power consumption (Typ., Cycle = Min.)
CXK581120J - 15	15ns	550mW
CXK581120J - 17	17ns	500mW
CXK581120J - 20	20ns	475mW

- Single +5V power supply:

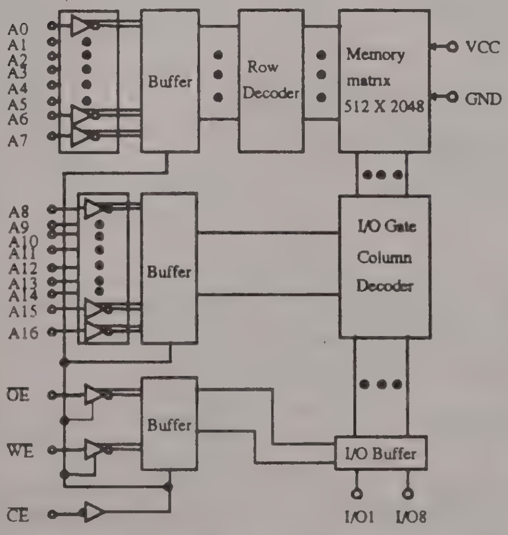
-15/17	5V +/-5%
-20	5V+/-10%

- Fully static memory...No clock or timing strobe required.
- Equal access and cycle time.
- Directly TTL compatible: All inputs and outputs.
- Common data input and output: three state output.
- Available in 32 pin 400mil SOJ package.

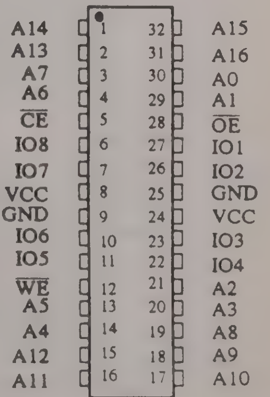
Pin Description

Symbol	Description
A0 to A16	Address input
I/O1 to I/O8	Data input/output
$\overline{CE}$	Chip enable input
$\overline{WE}$	Write enable input
$\overline{OE}$	Output enable input
Vcc	+5V power supply
GND	Ground

Block Diagram


A0
A1
A2
A3
A4
A5
A6
A7
Buffer
Row Decoder
Memory matrix 512 X 2048
VCC
GND
A8
A9
A10
A11
A12
A13
A14
A15
A16
Buffer
I/O Gate Column Decoder
OE
WE
Buffer
I/O Buffer
CE
I/O1
I/O8

Pin Configuration (Top View)


A14 1
A13 2
A7 3
A6 4
CE 5
IO8 6
IO7 7
VCC 8
GND 9
IO6 10
IO5 11
WE 12
A5 13
A4 14
A12 15
A11 16
32 A15
31 A16
30 A0
29 A1
28 OE
27 IO1
26 IO2
25 GND
24 VCC
23 IO3
22 IO4
21 A2
20 A3
19 A8
18 A9
17 A10

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Video Processing

Color Decoding (Analog)

Part Number	Function	Volt	Package
CXA1585Q*	NTSC/PAL, Video in, RGB out	5V	32P QFP
CXA1218S/ 1228S*	NTSC/PAL, Video in, YUV output	5V	28P SDIP
SBX1761-01*	Video Input Module, NTSC 18bit Input RGB out	5V	64P SDIP
SBX1762-01*	Video Input Module, NTSC 24bit Input RGB out	5V	64P SDIP
SBX1761-10	Video Input Module, NTSC/S-Video Input 18bit RGB out	5V	64P
SBX1761-50	Video Input Module, PAL/S-Video Input 18bit RGB out	5V	64P
SBX1793-01/21	S-Video Input Module, NTSC/S-Video Input 24bit RGB out	5V	64P

Color Encoding (Analog)

Part Number	Function	Volt	Package
CXA1145P/M*	RGB input, NTSC/PAL Video out	5V	24P DIP/SOP
CXA1219/ 1229P/M*	YUV input, NTSC/PAL Video out	5V	24P DIP/SOP
CXA1645M*	Delay Line BPF built in, RGB input, NTSC/PAL Video out	5V	28P SDIP

Analog to Digital Conversion

Part Number	Function	Volt	Package
CXD1172 AM/AP	6bit 20MSPS Video A/D Converter	5V	16 SOP/DIP
CXD1176Q	8bit 20MSPS Video A/D Converter	5V	32P QFP
CXD1179Q	8bit 35MSPS Video A/D Converter	5V	32P QFP

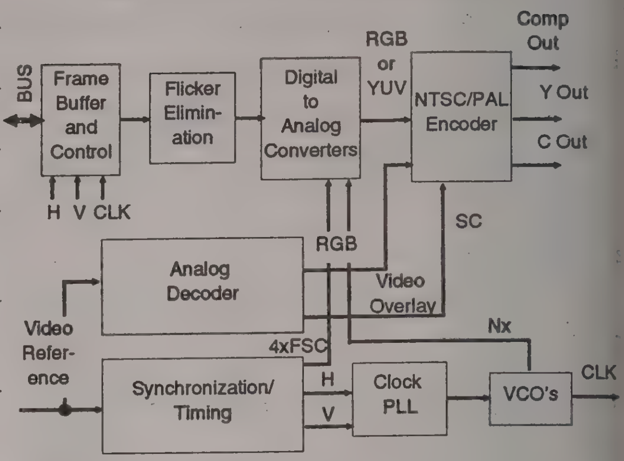
Digital to Analog Conversion

Part Number	Function	Volt	Package
CXD1177Q	8bit 40MSPS RGB 2-channel D/A Converter	5V	32P QFP
CXD1178Q	8bit 40MSPS RGB 3-channel D/A Converter	5V	48P QFP

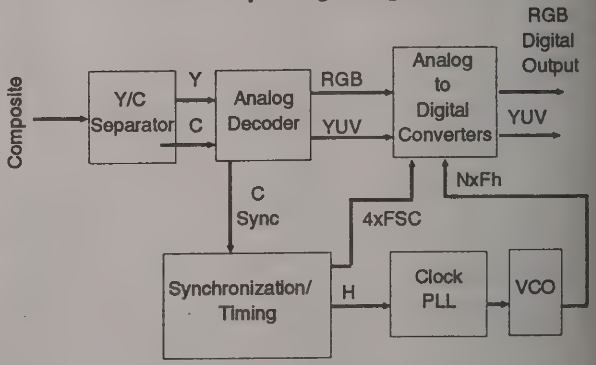
Digital Processing

Part Number	Function	Volt	Package
CXD2011Q*	Digital Comb Filter	5V	80P QFP
CXK1202Q	Digital Delay Line Memory	5V	32P QFP
CXK1202S	Digital Delay Line Memory	5V	32P QFP
CXK1206 AM/ATM	1.2Mbit, 3 port Video Memory	5V	38P SOP/ 44Pin TSOP
CXK48324Q/R	2.4MBits, 3 ports Video Memory	5V	64P QFP/ 80Pin VQFP

Video Output with Graphics Overlay


BUS
Frame Buffer and Control
H V CLK
Flicker Elimin-ation
Digital to Analog Converters
RGB or YUV
NTSC/PAL Encoder
Comp Out
Y Out
C Out
SC
RGB
Analog Decoder
Video Overlay
Video Refer-ence
4xFSC
Nx
Synchronization/ Timing
H
V
Clock PLL
VCO's
CLK

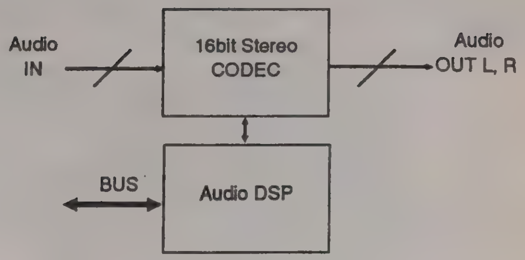
Video Input Digitizing

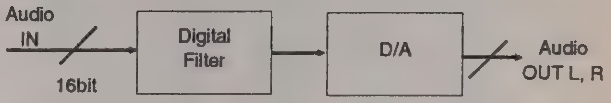

Composite
Y/C Separator
Y
C
Analog Decoder
RGB
YUV
Analog to Digital Converters
RGB Digital Output
YUV
NxFh
C Sync
4xFSC
Synchronization/ Timing
H
Clock PLL
VCO

Audio Processing

Part Number	Function	Volt	Package
CXD2555Q*	Audio Delta Sigma Type A/D+D/A+D/F	5V	48P QFP
CXD2570Q*	Audio Delta Sigma Type A/D+D/A+D/F	5V	48P QFP

Digital Audio


Audio IN
16bit Stereo CODEC
Audio OUT L, R
BUS
Audio DSP


Audio IN
16bit
Digital Filter
D/A
Audio OUT L, R

Application Notes

Number	IC's/Applications
CAV01	CXD2555Q PCB
CAV02	Video Input Module
CAV03	CXD2570Q PCB

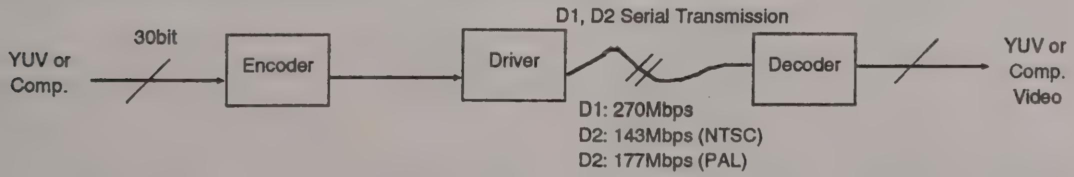
Evaluation Board

Description
NTSC/PAL Decoders; CXA1218S, CXA1228S
CXA1585Q PCB
NTSC/PAL Encoders; CXA1145P/M, CXA1219P/M, CXA1229P/M
VIM PCB, SBX1761-01, SBX1762-01

* Evaluation Board Available

Communication Audio/Video

Number	Description	Package	Voltage
SBX1601A	Serial Interface/Transmission Encoder	37 Pin PGA	±5V
SBX1602A	Serial Interface/Transmission Decoder	37 Pin PGA	±5V
CXA1389AQ	Cable Driver for Digital Transfer	32 Pin QFP	-5V
CXD8068G	4:2:2 D1 Video Encoder	132 Pin PGA	5V
CXD8069G	4:2:2 D1 Video Decoder	132 Pin PGA	5V
CXD8110K	D2 Video Transmitter CoProcessor	68 Pin PLCC	5V
CXD8129K	D2 Video Receiver CoProcessor	68 Pin PLCC	5V


D1, D2 Serial Transmission
30bit
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Encoder
Driver
Decoder
YUV or Comp. Video
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D2: 143Mbps (NTSC)
D2: 177Mbps (PAL)

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PRODUCT	CLOCK FREQUENCY	DESCRIPTION
STEL-1130	60 MHz	Linear Quadrature Amplitude Modulator
STEL-1172B	50 MHz	32-bit NCO, Quadrature Outputs
STEL-1173	50 MHz	48-bit NCO, Sub-MicroHz Resolution
STEL-1173RH	40 MHz	Rad Hard with 1 MRad Tolerance
STEL-1174	50 MHz	16-bit NCO, Low Price
STEL-1175	80 MHz	32-bit NCO with Linear PM
STEL-1176	80 MHz	83/4 Decade Decimal NCO with BCD Control
STEL-1177	60 MHz	32-bit NCO with Linear PM and FM ports
STEL-1178A	80 MHz	32-bit NCO Dual with PSK
STEL-1179	25 MHz	24-bit NCO, PSK and Low Price
STEL-1180	60 MHz	32-bit Chirp Generating NCO
STEL-2172	300 MHz	28-bit ECL NCO
STEL-2173	1 GHz	GaAs NCO with PSK

BOARD LEVEL DDS PRODUCTS

PRODUCT	CLOCK FREQUENCY	DESCRIPTION
STEL-1272	Quadrature output 0 to 22 MHz	DDS
STEL-1273	0 to 22 MHz	DDS with Sub- MicroHz Resolution
STEL-1275	0 to 35 MHz	DDS with Linear PM
STEL-1276	0 to 35 MHz	DDS with 0.1 Hz Resolution and BCD Control
STEL-1277	0 to 35 MHz	DDS with Linear PM and FM
STEL-1375A	0 to 35 MHz	Miniature DDS Module with Linear PM
STEL-1376	0 to 35 MHz	Miniature DDS Module with BCD Control
STEL-1377	0 to 35 MHz	Miniature DDS Module with Linear PM and FM
STEL-1378A	Dual 0 to 35 MHz	Miniature DDS Module with PSK
STEL-1479	0 to 12 MHz	Hybrid DDS, 1.5" by 0.8", Low price
STEL-2272	0 to 130 MHz	DDS
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STEL-2373	0 to 400 MHz	DDS Hybrid with PSK, 2" by 1.1"

CHASSIS LEVEL DDS PRODUCTS

PRODUCT	CLOCK FREQUENCY	DESCRIPTION
STEL-9272	0 to 130 MHz	Complete DDS with Phase Lockable Clock
STEL-9275	0 to 400 MHz	Complete DDS with Phase Lockable Clock

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STEL-2130
STEL-2110A
STEL-2210

Wireless Communication at Your Finger Tips

Low Cost Convolutional Encoder/Veterbi Decoder
With a 12 Mbps data rate, the STEL-2030B operates at code rate 1/2 and also with punctured codes at code rates 2/3 and 3/4. It also includes a V.35 Scrambler and BER Monitor.

Highest Flexibility PN Coder
At 30 Mcps and up to 32 taps per coder the STEL-1032 Triple PN Coder has the flexibility to generate a wide variety of codes for many spread spectrum applications.

Digital Downconverter and Carrier Tracker
The STEL-2130A can be used to convert signals digitized at up to 40 Msamples/sec at I.F. directly to baseband.

Highest Performance Digital Matched Filter (cascadable)
The STEL-3310 64-Tap Cascadable Complex Matched Filter provides fast acquisition of PN sequences up to 256 chips/symbol at up to 22 Msamples/sec.

Low Cost and Low Power Digital Matched Filter (noncascadable)
The STEL-3340 can be used in many of the same application as the STEL-3310 with a limit of 64 chips/symbol, with lower cost and power consumption.

Phase Modulated NCO
The STEL-1175 Numerically Controlled Oscillator offers 32-bit resolution and 80 MHz clock frequency. It can be phase modulated at up to 20 MHz.

Highest Speed Accumulator/Correlator
At a 70 Msamples/sec accumulation rate, and up to 32K samples without overflow, the STEL-2410 is the industry's highest speed signal accumulator/correlator for spread spectrum applications.

Bit Synchronizer and BPSK/QPSK Demodulator
The STEL-2110A can be used for coherent and differential demodulation of signals up to 6 Mbps BPSK and 12 Mbps QPSK. The STEL-2110A includes a symbol timing NCO and phase or frequency discriminator for carrier tracking.

Differential BPSK/QPSK Demodulator
The STEL-2120 can be used for differential demodulation of signals up to 8 Mbps BPSK and 16 Mbps QPSK in both Spread Spectrum and Clear Channel applications

Fastest Burst Data Acquisition
The STEL-2210 Block Phase Estimator allows fast acquisition of burst data. It can be used for coherent demodulation of signals at up to 8 Mbps BPSK and 16 Mbps QPSK without a carrier tracking PLL

For further information on these or any other product offered by Stanford Telecom, please contact us today.

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COMPANY OVERVIEW

Technology

Synergy has implemented a world leadership bipolar-based technology which incorporates the most advanced process modules and isolation techniques to produce the industry's fastest speeds at lower power levels than previously achievable. Unlike other bipolar technologies, Synergy's proprietary ASSET™ (All Spacer Separated Element Transistor) Technology is optimized to produce both memory and logic products offering superior performance compared to all domestic and foreign-based competitors.

Synergy's patented architectural innovations produce significant customer benefits in both performance and density:

— Spacers allow element separations to be determined by film thickness rather than by lithographic space, resulting in a dramatic reduction in element separation;

— ASSET's trench isolation results in transistors which are 40% smaller than competitive transistors produced under similar lithographic conditions.

Initial products were produced with a very conservative 1.5µ implementation of ASSET, ensuring manufacturability while providing leadership performance. The current 1.2µ version produces devices which achieve an f_T of 17GHz and unloaded gate delays of 70ps at just 1mW.

ASSET is a fully self-aligned technology which is scalable to submicron levels. Using the current 1.2µ version of ASSET, Synergy is producing 16Kx4 SRAMs, an Advanced Self-Timed 2Kx9 STRAM, and the System Elements™ family. In the next twelve months, the company will introduce the first products designed in its ASSET-based BiCMOS, ASSET II technology (offering further advancements in density and performance), and an exciting array of new products.

The result of combining Synergy's patented circuit design and processing technologies is the highest-performance, manufacturable *system solutions*.

Products

Synergy currently offers a complete series of ultra-fast 1K, 4K, 16K and 64K ECL SRAMs; the ECLinPS™ Logic Family (including ECLinPS Lite); the Super-300K™ Logic Family; and both RAM-Intensive and Universal System Elements (RISE™ and USE™, respectively). With speeds to 3ns (1K and 4K) and 5ns (16K and 64K), all SRAMs are designed for alpha-particle immunity and feature balanced read and write times. Additional customer benefits include tighter skews, 2000V ESD protection and 10KH/100K I/O options .

New products to be introduced in 1993, most of which are contained in this catalog, include ultra-fast FIFOs, PECL Clock Distribution circuits (Positive ECL with TTL outputs) for TTL systems operating at 50MHz and above, 9-bit high-speed translators and an increasing range of RISE™ and USE™ semi-custom System Elements™. Synergy will continue to develop unique and complementary product families which will increase the usable speed available to the high-performance system designer.

Strategic Alliance

In order to ensure our customers large volumes of cost-effective ultra-high-performance complex products, Synergy Semiconductor has entered into a comprehensive strategic alliance with Toshiba Corporation. This strategic alliance incorporates four closely linked agreements:

— a joint R&D pact,
— a manufacturing agreement,
— a technology licensing agreement, and
— an equity investment.

Under the terms of the manufacturing agreement, Toshiba will provide Synergy with the use of a new high-volume (6-inch, submicron) IC fabrication line, which will run Synergy's high-performance bipolar ASSET and BiCMOS technologies. This fab will allow Synergy to utilize world-class manufacturing capabilities to produce its current SRAM, logic and System Element products, as well as future products.

Through its equity investment in Synergy, Toshiba has recognized Synergy's leadership in bipolar-based process and design technologies. Toshiba is a minority shareholder (<10%).

Facilities

Synergy is headquartered in Santa Clara, California. The company's operations are housed in a 48,000 square foot facility which incorporates all aspects of its business from R&D to design, wafer fabrication, test, shipping and administration. The facility includes a 7,000 square foot, modern wafer fab clean room with equipment operating in a sub-Class 20 environment. The fab area contains state-of-the-art high resolution steppers, dry etchers, films deposition systems, etc. The production test area utilizes advanced test equipment capable of holding uniquely tight picosecond-level testing accuracies.

Synergy Semiconductor, a leader in the high-performance market, designs, manufactures and markets the industry's fastest memory, logic and semi-custom products. Synergy utilizes a unique proprietary process, combined with design innovations, to provide the very best in *UltraFast Usable Speed*^{SM} products.

A key factor in the company's early success has been the *synergy* between a highly experienced and motivated team, in-house wafer fabrication and state-of-the-art technology and test capabilities. These components will continue to keep Synergy in the forefront of the high-performance market.

European Joint Venture

Synergy is also the managing partner of System Microelectronic Innovation GmbH (SMI). SMI is a joint venture between Synergy Semiconductor and the German government, and is located in Frankfurt (Oder). The plant houses a large wafer fabrication facility, as well as plastic and hermetic package assembly lines, a large CAD design capability and production test areas. Synergy has licensed its ASSET technology to the new venture.

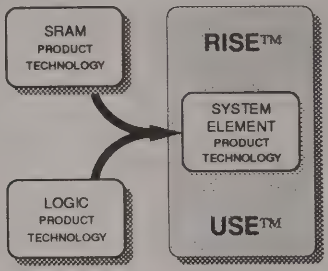
SMI will continue to market its existing products into consumer, computer, industrial and telecom markets. It will also market Synergy's family of ultra-fast ECL SRAMs, logic, clock control, translator and semicustom products into the European sector. Manufacturing capability for ASSET products will be on-line in late 1993, and the two companies will continue working together on the development of new products — primarily aimed at high-performance telecommunications and computation applications emerging throughout Europe. The company also expects to establish foundry relationships to produce both digital and analog products for both North American and European customers.

SYSTEM ELEMENTS™ FAMILY

Semicustom Product Family

BENEFITS

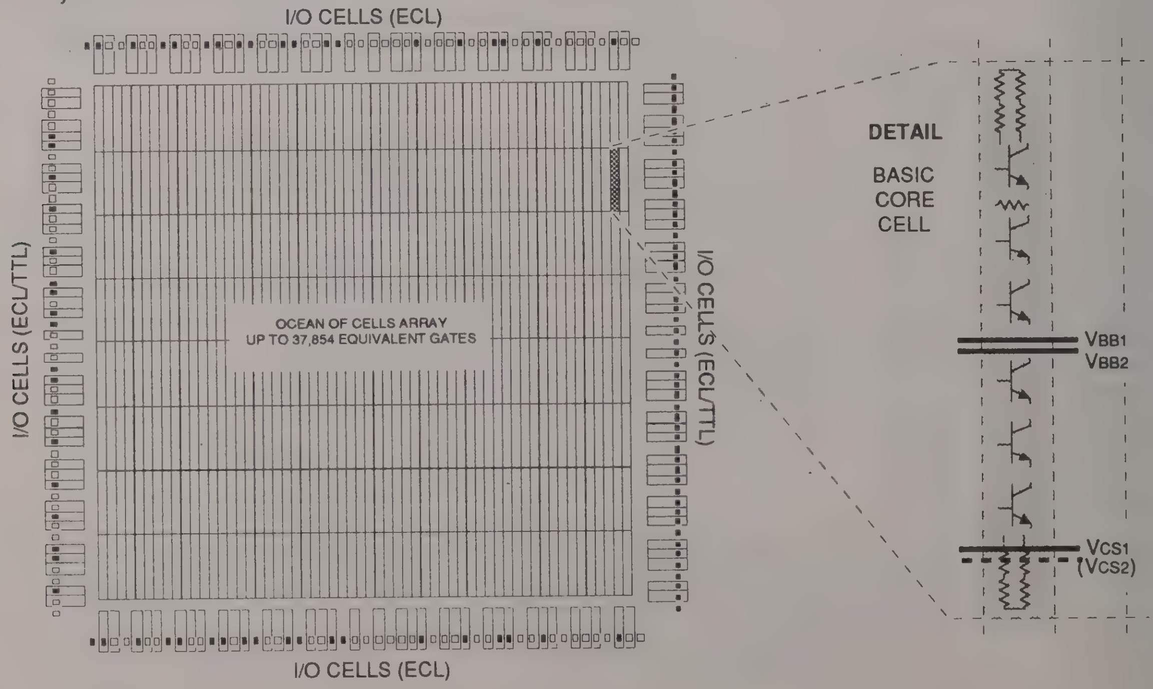
- Fastest throughput
  - Highest-density logic cells
  - Reduced interconnect delays — logic/memory on same chip
- Fastest, highest-density, proven SRAM (<3ns)
  - Embedded blocks on RISE devices
  - Compiled RAM on all devices — ORCA™
- Mixed signal capability via ANALOG ZONE™
- Lower power than competing products
- Interface flexibility — ECL, TTL and analog I/O
- State-of-the-art CAD/CAE tool set — DAVE™
- Assured supply
  - Production-proven process technology — ASSET™
  - True second-source available now


SRAM
PRODUCT
TECHNOLOGY
RISE™
SYSTEM
ELEMENT
PRODUCT
TECHNOLOGY
LOGIC
PRODUCT
TECHNOLOGY
USE™

UNIVERSAL SYSTEM ELEMENTS (USE™)

Device Part Number	Gross Cells	Analog Capable?	I/O Pins	Total Pins	Available Date	'92 Data Book Page No.
SY05BP00	495	Yes	24	32	*	N/A
SY1BP00	888	Yes	32	64	NOW	9-8
SY2BP00	2,184	Yes	60	86	NOW	N/A
SY4BP00	5,180	Yes	80	120	NOW	9-11
SY11BP00	11,730	Yes	112	168	NOW	9-14
SY21BP00	20,680	Yes	144	216	NOW	9-17
SY34BP00	37,854	Yes	192	296	NOW	9-20

*Contact factory.


I/O CELLS (ECL)
I/O CELLS (ECL/TTL)
OCEAN OF CELLS ARRAY
UP TO 37,854 EQUIVALENT GATES
I/O CELLS (ECL/TTL)
DETAIL
BASIC
CORE
CELL
VBB1
VBB2
VCS1
(VCS2)
I/O CELLS (ECL)

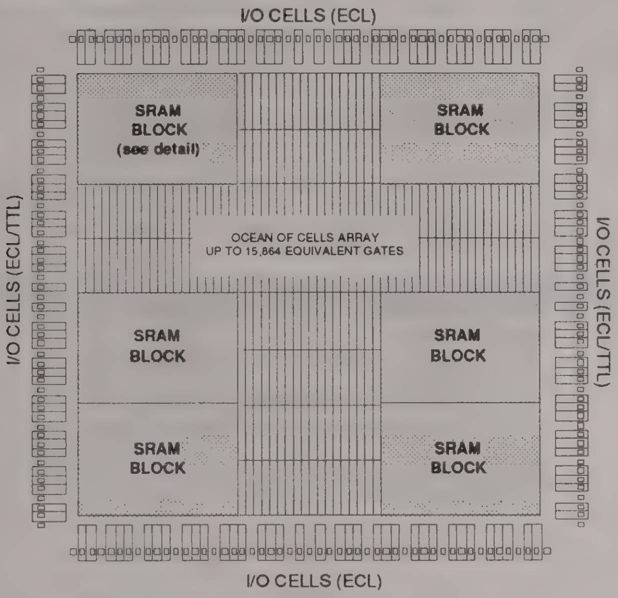
SYSTEM ELEMENTS (CONT.)

Semicustom Product Family

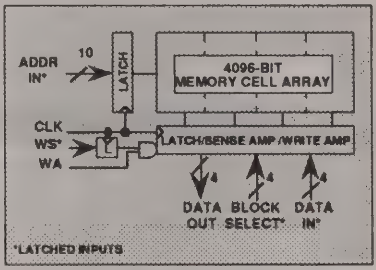
RAM INTENSIVE SYSTEM ELEMENTS (RISE™)

Device P/N	Gross Cells	SRAM Block Size	SRAM # Blocks	Analog Capable?	I/O Pins	Total Pins	Available Date	'92 Data Book Page No.
SY8BP4R2	7,578	64 x 28	4	Yes	112	168	*	9-23
SY9BP6R4	7,410	1K x 4	6	Yes	144	216	NOW	9-26
SY15BP10R4	15,864	1K x 4	10	Yes	192	296	NOW	N/A

*Contact factory.

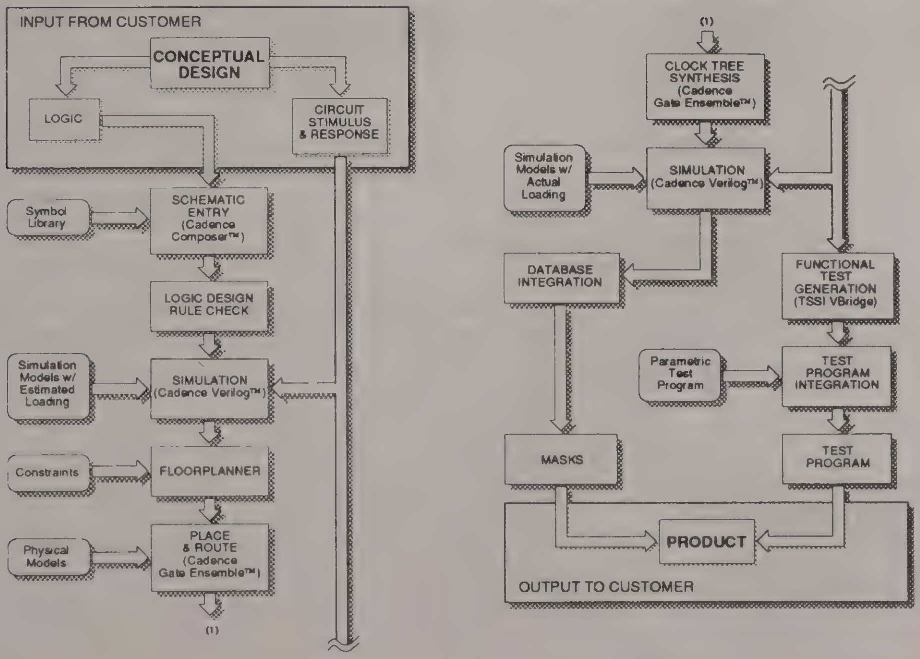

I/O CELLS (ECL)
SRAM BLOCK (see detail)
SRAM BLOCK
OCEAN OF CELLS ARRAY UP TO 15,864 EQUIVALENT GATES
SRAM BLOCK
SRAM BLOCK
SRAM BLOCK
SRAM BLOCK
I/O CELLS (ECL/TTL)
I/O CELLS (ECL/TTL)
I/O CELLS (ECL)

DETAIL
1K x 4 SRAM BLOCK


ADDR IN*
10
LATCH
4096-BIT MEMORY CELL ARRAY
CLK
WS*
WA
L
LATCH/SENSE AMP /WRITE AMP
4
4
4
DATA OUT
BLOCK SELECT*
DATA IN*
*LATCHED INPUTS

EXAMPLE SHOWN IS SY9BP6R4

DESIGN FLOW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FLOORPLANNER
Physical Models
PLACE & ROUTE (Cadence Gate Ensemble™)
(1)
(1)
CLOCK TREE SYNTHESIS (Cadence Gate Ensemble™)
Simulation Models w/ Actual Loading
SIMULATION (Cadence Verilog™)
DATABASE INTEGRATION
FUNCTIONAL TEST GENERATION (TSSI VBridge)
Parametric Test Program
TEST PROGRAM INTEGRATION
MASKS
TEST PROGRAM
PRODUCT
OUTPUT TO CUSTOMER

SYNERGY
SEMICONDUCTOR

CLOCK/FREQUENCY SYNTHESIS

BENEFITS

- Ultra-low jitter
- High noise immunity with differential VCO and filter
- Superior ESD protection of 2000V
- Single supply PECL and TTL
- Ideal high frequency clock source for TTL or ECL systems

Device Part Number	Description	Frequency Range	Features	Avail.	'92 Data Bk Page No.
SY89424	Frequency Multiplier w/Oscillator	200–250MHz	5x Multiplier, < ±25ps Jitter	1Q'94	N/A
SY89429	Programmable Clock Generator	25–400MHz	1MHz Step, < ±25ps Jitter	NOW	N/A

TRANSLATORS

BENEFITS

- High speed; low power
- Choice of bus width and package type for flexibility
- Superior ESD protection of 2000V
- Single or dual supply translation
- Suitable for TTL/PECL/ECL systems

Device Part Number	Description	Input/Output Bus Width	Translation Speed (ns)	Single/ Differential	Avail.	'92 Data Bk Page No.
SY10H/100H600	TTL-to-ECL/Output Enable	9	3.5	Single In/Single Out	NOW	6-2
SY10H/100H601	ECL-to-TTL/3-State Enable	9	4.8	Single In/Single Out	NOW	6-4
SY10H/100H602	Latched TTL-to-ECL	9	3.5	Single In/Single Out	NOW	6-6
SY10H/100H603	Latched ECL-to-TTL	9	4.8	Single In/Single Out	NOW	6-8
SY10H/100H606	Registered Hex TTL-to-PECL	6	3.0	Single In/Differential Out	NOW	N/A
SY10H/100H607	Registered Hex PECL-to-TTL	6	6.5	Differential In/Single Out	NOW	N/A
SY100S324	TTL-to-ECL	6	1.5	Single In/Differential Out	NOW	6-20
SY100S325	ECL-to-TTL	6	3.0	Differential In/Single Out	NOW	6-24
SY100S328	Octal TTL-ECL Bi-directional w/Latch	8	3.8	EN-to-ECL Out	3Q'93	6-28
SY100S329	Octal TTL-ECL Bi-directional w/Register	8	3.9	EN-to-ECL Out	NOW	N/A
SY10ELT/100ELT22	Dual TTL-to-Differential PECL	2	1.5	Single In/Differential Out	NOW	N/A
SY10ELT/100ELT23	Dual Differential PECL-to-TTL	2	3.0	Differential In/Single Out	NOW	N/A

SYNERGY SEMICONDUCTOR

CLOCK CONTROL & DISTRIBUTION

BENEFITS

- Ultra low skew; Ideal for systems requiring low skew clock networks
- Superior ESD protection of 2000V
- 20ps step delay lines for precise clock edge placement
- Single power supply PECL/TTL/ECL

Device Part Number	Description	Output Clocks	Pin-to-Pin Skew (Max. ps)	Avail.	'92 Data Bk Page No.
SY10H/100H641	Single Supply PECL-to-TTL 1:9 Clock Driver	9	500	NOW	7-2
SY10H646	Single Suypply PECL/TTL-to-TTL 1:8 TTL Clock Driver	8	500	NOW	N/A
SY10H/100H841	Single Supply PECL-to-TTL 1:4 Clock Driver w/Output Enable	4	500	NOW	7-7
SY10H/100H842	Single Supply PECL-to-TTL 1:4 Clock Driver w/Latched Output Enable	4	500	NOW	7-8
SY10H/100H843	Single Supply PECL-to-TTL 1:4 Clock Driver w/ Latched Output Enable and Synchronized Disable	4	500	*	7-13
SY10E/100E111	1:9 Differential Clock Driver	9	50	NOW	7-14
SY10E/100E195	Programmable Delay Chip	N/A	N/A	NOW	4-77
SY10E/100E196	Programmable Delay Chip & Analog	N/A	N/A	NOW	4-83
SY69401 CopyClock™	Master/Slave Auto De-Skew Clock Distribution System (PECL-to-TTL, Single Supply)	8	500/System	NOW	N/A

* Consult factory.

FIFOs

BENEFITS

- Fastest, highest density, *proven* technology
- System clock speeds to 1GHz
- Data bus widths to 24 bits produce highly-efficient data transfers
- Both ECL I/O and TTL I/O devices
- Status flag outputs (Full, Half-Full, Empty)
- May be customized to meet specialized requirements
- Lower power than competing products
- Cost-effective, thermally-enhanced packages (plastic and/or ceramic)
- Programmable-length capability

Device P/N	Cycle Time (ns)(1)	Organization Words	Bits	Power Diss. Watts (typ.)	I/O Pins	Package Size	Available Date	'92 Data Bk Page No.
SY69164	3	1024	24	16	24/24	208	*	8-1
SY69165	1	3072	8	16	8/8	208	*	8-2
SY69167	5	64	18	3	18/18	64	NOW	8-3
SY69168	10(2)	64	18	3	18/18	64	NOW	8-4
SY69170	3(2)	2 to 2048	12	16	12/12	208	*	8-5

NOTES:

* Contact factory.

1. Time required for a single Read or a single Write.
2. Time required for Read plus Write.

SYNERGY
SEMICONDUCTOR

ECLinPS™ LOGIC

BENEFITS

- Ultra-fast gate speeds for performance-oriented ECL systems
- 100% compatible with Motorola
- Packaged in space-efficient high-performance 28-lead PLCC
- Superior ESD protection of 2000V
- Typical edge rates of 500ps
- Industry standard 10KH and 100K I/O levels
- Extended supply voltage option:
  - $V_{EE} = -4.2V$ to $-5.46V$

Part Number	Description	Max. Delay (ps)	10KH I_{EE} Min. mA	100K I_{EE} Min. mA	Avail.	1992 Data Book Page No.
SY10E/100E016	8-Bit Synchronous Binary Up Counter	700MHz*	181	208	NOW	4-2
SY10E/100E101	Quad 4-Input OR/NOR Gate	500	36	42	NOW	4-10
SY10E/100E104	Quint 2-Input AND/NAND Gate	600	46	53	NOW	4-12
SY10E/100E107	Quint 2-Input XOR/NOR Gate	600	50	58	NOW	4-14
SY10E/100E111	1:9 Differential Clock Driver	630	60	69	NOW	4-16
SY10E/100E112	Quad Driver with Enable	600	56	65	NOW	4-19
SY10E/100E116	5-Bit Differential Line Receiver	450	35	40	NOW	4-21
SY10E/100E122	9-Bit Buffer	500	49	57	NOW	4-23
SY10E/100E131	4-Bit D Flip-Flop	700	70	81	NOW	4-25
SY10E/100E136	6-Bit Universal Counter	550MHz*	150	170	NOW	4-28
SY10E/100E137	8-Bit Ripple Counter	2200	145	167	NOW	4-34
SY10E/100E141	8-Bit Shift Register	975	157	181	NOW	4-37
SY10E/100E142	9-Bit Shift Register	1000	145	165	NOW	4-39
SY10E/100E143	9-Bit Hold Register	1000	145	165	NOW	4-42
SY10E/100E150	6-Bit Latch	550	62	72	NOW	4-45
SY10E/100E151	6-Bit D Register	800	78	90	NOW	4-47
SY10E/100E154	5-Bit 2:1 Mux-Latch	700	91	105	NOW	4-49
SY10E/100E155	6-Bit 2:1 Mux-Latch	700	102	117	NOW	4-51
SY10E/100E156	3-Bit 4:1 Mux-Latch	900	90	103	NOW	4-53
SY10E/100E157	Quad 2:1 Mux, Individual Select	550	38	44	NOW	4-55
SY10E/100E158	5-Bit 2:1 Multiplexer	550	40	46	NOW	4-57
SY10E/100E160	12-Bit Parity Generator/Checker	950	98	113	NOW	4-59
SY10E/100E163	Dual 8-Input Multiplexer	800	88	100	NOW	4-62
SY10E/100E164	16:1 Multiplexer	850	71	81	NOW	4-64
SY10E/100E166	9-Bit Magnitude Comparator	1100	136	156	NOW	4-66
SY10E/100E167	6-Bit 2:1 Mux-Register	800	113	130	NOW	4-68
SY10E/100E171	3-Bit 4:1 Multiplexer	650	67	77	NOW	4-70
SY10E/100E175	8-Bit Error Detection/Correction (EDAC)	800	132	152	NOW	4-72
SY10E/100E193	8-Bit EDAC/Parity	1000	134	155	NOW	4-74
SY10E/100E195	Programmable Delay Chip	1765	156	179	NOW	4-77
SY10E/100E196	Programmable Delay Chip & Analog	1765	156	179	NOW	4-83

*Guaranteed minimum operating frequency.

ECLinPS™ LOGIC (CONT.)

Part Number	Description	Max. Delay (ps)	10KH I_{EE} Min. mA	100K I_{EE} Min. mA	Avail.	1992 Data Book Page No.
SY10E197	Data Separator	150MHz*	180	N/A	1Q'94	N/A
SY10E/100E212	3-Bit Scannable ECL Driver	1025	96	212	NOW	4-90
SY10E/100E241	8-Bit Scannable Register	975	150	173	NOW	4-92
SY10E/100E256	3-Bit 4:1 Mux-Latch	900	83	96	NOW	4-95
SY10E/100E336	3-Bit Registered Bus Transceiver	1000	150	173	NOW	4-97
SY10E/100E337	3-Bit Scannable Register Bus Transceiver	1000	174	200	NOW	4-100
SY10E/100E404	Quad High Frequency Diff. AND	650	127	146	NOW	4-103
SY10E/100E416	Quint High Frequency Line Receiver	500	162	186	NOW	4-105
SY10E/100E431	3-Bit Diff. Set/Rest Flip-Flop	750	132	152	NOW	4-107
SY10E/100E445	4-Bit Serial/Parallel Converter	2000MHz*	185	212	NOW	4-109
SY10E/100E446	4:1 Parallel/Serial Converter	1300MHz*	185	212	NOW	4-115
SY10E/100E451	6-Bit D-Reg., Diff. Data & CLK Inputs	800	101	116	NOW	4-116
SY10E/100E452	5-Bit D-Reg., Diff. Data, CLK & Q	800	89	102	NOW	4-118
SY10E/100E457	Triple High Frequency Diff. 2:1 Mux	650	110	127	NOW	4-120
SY10E1651	Dual Analog Comparator w/Latch	1150	55	N/A	NOW	N/A
SY10E1652	High-Perf. Dual Analog Comp. w/Latch	1150	55	N/A	NOW	N/A

ECLinPS™ LITE

Part Number	Description	Max. Speed (ps)	10KH I_{EE} Max. mA	100K I_{EE} Max. mA	Avail.	Data Book Page No.
SY10EL/100EL01	4-Input OR/NOR	350	17	20	1Q'94	N/A
SY10EL/100EL04	2-Input AND/NAND	395	17	20	NOW	N/A
SY10EL/100EL05	2-Input Differential AND/NAND	420	22	25	1Q'94	N/A
SY10EL/100EL07	2-Input XOR/XNOR	415	17	20	1Q'94	N/A
SY10EL/100EL11	2:1 Differential Fanout Buffer	365	31	36	1Q'94	N/A
SY10EL/100EL12	Low-Impedance Driver	480	17	20	1Q'94	N/A
SY10EL/100EL16	Differential Receiver	355	22	26	1Q'94	N/A
SY10EL/100EL31	D Flip-Flop with Set & Reset	2200MHz*	32	37	NOW	N/A
SY10EL/100EL32	÷2 Divider	2600MHz*	30	35	1Q'94	N/A
SY10EL/100EL33	÷4 Divider	3800MHz*	33	37	1Q'94	N/A
SY10EL/100EL35	JK Flip-Flop	1800MHz*	32	37	1Q'94	N/A
SY10EL/100EL51	Differential Clock D Flip-Flop	2200MHz*	29	36	1Q'94	N/A
SY10EL/100EL52	Differential Data & Clock D Flip-Flop	2200MHz*	25	29	1Q'94	N/A
SY10EL/100EL58	2:1 Multiplexer	360	17	19	1Q'94	N/A
SY10EL89	Coaxial Cable Driver	490	28	N/A	1Q'94	N/A
SY10ELT/100ELT22	Dual TTL-to-Diff PECL Translator	1500	I_{CC} = 30mA		NOW	N/A
SY10ELT/100ELT23	Dual Diff PECL-to-TTL Translator	3000	I_{CC} = 20mA		NOW	N/A

*Guaranteed minimum operating frequency.

SYNERGY
SEMICONDUCTOR

SUPER-300K™ LOGIC

BENEFITS

- Ultra-fast gate speeds for performance-oriented ECL systems
- SUPER-300K devices are pin-compatible with National and Signetics F100K and National 300K
- SUPER-300K devices offer almost twice the speed at similar power of 300K
- SUPER-300K functions offer almost twice the speed and half the power of F100K functions from National and Signetics
- SUPER-300K devices packaged in CERDIP, CERPACK and PLCC
- Superior ESD protection of 2000V
- Typical edge rates of 500ps
- Fully compatible with industry standard 100K ECL power supply and I/O levels
- Extended supply voltage option:
  - V_{EE} = –4.2V to –5.46V

Part Number	Description	Max. Speed (ps) DIP	Flat	PLCC	I_{EE} Min. mA	Avail.	'92 Data Bk Page No.
SY100S301	Triple 5-Input OR/NOR Gate	900	800	750	–25	NOW	5-2
SY100S302	Quint 2-Input OR/NOR Gate	800	750	700	–45	NOW	5-5
SY100S304	Quint AND/NAND Gate	1250	1150	1050	–60	NOW	5-8
SY100S307	Quint Exclusive OR/NOR Gate	1200	1100	1000	–58	NOW	5-11
SY100S313	Quad Driver	900	850	800	–60	NOW	5-14
SY100S314	Quint Differential Line Receiver	1100	1000	900	–60	NOW	5-17
SY100S317	Triple 2-Wide OA/OAI Gate	1100	1000	900	–48	NOW	5-20
SY100S318	5-Wide 5, 4, 4, 4, 2 OA/OAI Gate	1000	900	800	–55	NOW	5-23
SY100S321	9-Bit Inverter	900	800	700	–55	NOW	5-26
SY100S322	9-Bit Buffer	900	800	700	–55	NOW	5-29
SY100S324	Hex TTL-to-ECL Translator	1500	1400	1400	–70	NOW	5-32
SY100S325	Hex ECL-to-TTL Translator	3000	2900	2900	–37	NOW	5-36
SY100S328	Octal ECL/TTL Bi-Directional w/Latch	3800	3600	3600	–169	NOW	5-40
SY100S329	Octal ECL/TTL Bi-Directional w/Reg	3900	3700	3700	–199	NOW	N/A
SY100S331	Triple D Flip-Flop	900	800	700	–80	NOW	5-42
SY100S336	4-Stage Counter/Shift Register	1300	1200	1100	–170	NOW	5-47
SY100S341	8-Bit Shift Register	1200	1100	1000	–150	NOW	5-55
SY100S350	Hex D Latch	1050	1000	900	–98	NOW	5-60
SY100S351	Hex D Flip-Flop	1400	1200	1200	–98	NOW	5-65
SY100S355	Quad Multiplexer/Latch	1300	1200	1100	–80	NOW	5-70
SY100S360	Dual Parity Checker/Generator	2400	2300	2200	–70	NOW	5-82
SY100S363	Dual 8-Input Multiplexer	1100	1000	900	–92	NOW	5-86
SY100S364	16-Input Multiplexer	1500	1400	1300	–63	NOW	5-90
SY100S366	9-Bit Comparator	1700	1600	1500	–120	NOW	5-101
SY100S370	Universal Demux/Decoder	1400	1300	1200	–92	NOW	5-105
SY100S371	Triple 4-Input Multiplexer w/Enable	1200	1100	1000	–68	NOW	5-110
SY100S891	5-Bit Registered Transceiver	—	—	1500	–216	NOW	5-114

LOW-POWER ECL RAMs

FEATURES

- Ultra-fast access times
- Ultra-fast write times
- Eliminates write recovery glitch found on competitors' ECL RAMs
- Designed for alpha particle immunity
- 1500V ESD protection
- Fully compatible with industry standard 10K and 100K ECL power supply and I/O levels
- Extended supply voltage option:
  - 100K = –4.5V with 100K I/O
  - 101K = –5.2V with 100K I/O
- Industry standard architecture and pinouts

Part Number	Description	Data Sheet Limits (ns) tAA	twW	Min. mA IEE	Availability	'92 Data Bk Page No.
SY10L/100L/101L422-5	256 x 4 ECL RAM	5	3.5	–150	NOW	3-1
SY10L/100L/101L422-7	256 x 4 ECL RAM	7	5	–150	NOW	3-1
SY10L/100L/101L474-5	1K x 4 ECL RAM	5	5	–180	NOW	3-10
SY10L/100L/101L474-7	1K x 4 ECL RAM	7	5	–180	NOW	3-10
SY10L/100L/101L484-7	4K x 4 ECL RAM	7	6	–220	NOW	3-19
SY10L/100L/101L484-8	4K x 4 ECL RAM	8	7	–220	NOW	3-19
SY10L/100L/101L484-10	4K x 4 ECL RAM	10	8	–220	NOW	3-19

ULTRA-FAST ECL RAMs

Part Number	Description	Data Sheet Limits (ns) tAA	twW	Min. mA IEE	Availability	'92 Data Bk Page No.
SY10/100/101422-3	256 x 4 ECL RAM	3	3	–250	NOW	2-1
SY10/100/101422-4	256 x 4 ECL RAM	4	4	–250	NOW	2-1
SY10/100/101474-3	1K x 4 ECL RAM	3	3	–300	NOW	2-7
SY10/100/101474-4	1K x 4 ECL RAM	4	4	–300	NOW	2-7
SY10/100/101480-6	16K x 1 ECL RAM	6	6	–260	NOW	2-13
SY10/100/101480-8	16K x 1 ECL RAM	8	10	–260	NOW	2-19
SY10/100/101480-10	16K x 1 ECL RAM	10	10	–220	NOW	2-19
SY10/100/101484-4.5	4K x 4 ECL RAM	4.5	4.5	–350	NOW	2-25
SY10/100/101484-5	4K x 4 ECL RAM	5	5	–350	NOW	2-25
SY10/100/101484-6	4K x 4 ECL RAM	6	6	–350	NOW	2-25
SY101492-5	2K x 9 Advanced ECL STRAM	5	5	–500	*	2-32
SY101492-6	2K x 9 Advanced ECL STRAM	6	6	–450	*	2-32
SY10/100/101494-5	16K x 4 ECL RAM	5	5	–395	NOW	2-45
SY10/100/101494-6	16K x 4 ECL RAM	6	6	–395	NOW	2-45
SY10/100/101494-7	16K x 4 ECL RAM	7	7	–395	NOW	N/A

*Contact factory.

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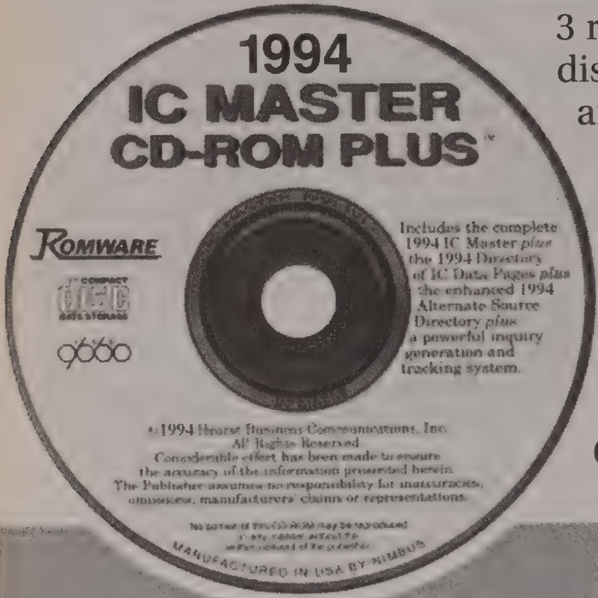
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1994
IC MASTER
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ROMWARE

Toshiba.

World Leader in Memory: Dynamic RAM.

Preliminary

262,144 Word x 16 Bit Multiport DRAM
Silicon Gate CMOS

TC524262SF/FT-60, TC524262SF/FT-70
TC524265SF/FT-60, TC524265SF/FT-70

The TC524262/265 is a 4Mb CMOS multiport memory equipped with a 262,144-word by 16-bit dynamic random access memory (RAM) port and a 512-word by 16-bit static serial access memory (SAM) port. The TC524262/265 supports three types of operations: Random access to and from the RAM port, high speed serial access from the SAM port and transfer of data from any selected row in the RAM to the SAM. To realize a high performance graphic frame buffer system the TC524262/265 features various special operations such as the write-per-bit, the pipelined page mode, the block write and flash write function on the RAM port and the read transfer operations from the RAM to the SAM port. In addition, extended fast page mode is available where an output data remains valid when the $\overline{\text{CASL}}/\overline{\text{CASU}}$ is high (TC524265 only). The TC524262/265 is fabricated using Toshiba's CMOS silicon gate process as well as advanced circuit designs to provide low power dissipation and wide operating margins.

FEATURES

		-60	-70
t_{RAC}	$\overline{\text{RAS}}$ Access Time (Max.)	60ns	70ns
t_{CAC}	$\overline{\text{CAS}}$ Access Time (Max.)	15ns	20ns
t_{AA}	Column Address Access Time (Max.)	30ns	35ns
t_{RC}	Cycle Time (Min.)	115ns	130ns
t_{PC}	Page Mode Cycle Time (Min.)	35ns	40ns
t_{SCA}	Serial Access Time (Max.)	15ns	20ns
t_{SCC}	Serial Cycle Time (Min.)	18ns	23ns
t_{RACP}	t_{RAC} in Pipelined Fast Page	85ns	90ns
t_{CAC1}	t_{CAC} in Pipelined Fast Page	15ns	20ns
t_{PCP}	Pipelined Fast Page Mode Cycle Time	30ns	30ns
I_{CC1}	RAM Operating Current (SAM: Standby)	110mA	100mA
I_{CC2A}	SAM Operating Current (RAM: Standby)	60mA	60mA
I_{CC2}	Standby Current	10mA	10mA

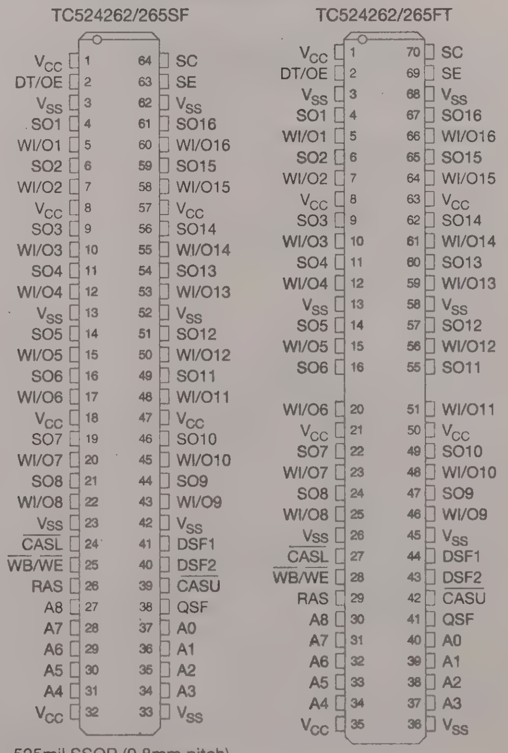
- Single power supply of 5V±10% with a built-in V_{BB} generator
- All inputs and outputs TTL compatible
- Organization
  RAM Port: 262,144 Words x 16 Bits
  SAM Port: 512 Words x 16 Bits
- RAM Port
  Fast Page Mode (TC524262), Extended Fast Page Mode (TC524265), Read-Modify-Write, Pipelined Fast Page Mode, $\overline{\text{CAS}}$ before $\overline{\text{RAS}}$ Auto Refresh, Hidden Refresh, $\overline{\text{RAS}}$ only Refresh, Write per Bit (New/Old Mask Mode), Masked Flash Write (New/Old Mask Mode), Block Write, Masked Block Write (New/Old Mask Mode), Load Mask Register/Color Register Cycle, 512 refresh cycles/8ms
- SAM Port
  Addressable TAP Capability
  Stop Address (Binary Boundary) Capability
  Fully Static Register
  Single Register/Split Register Mode Capability
- RAM-SAM Transfer
  Read/Real Time Read Transfer
  Split Read Transfer
- Package
  TC524262/265SF: SSOP64-P-525
  TC524262/265FT: TSOP70-P-400

PIN NAMES

A0~A8	Address inputs
$\overline{\text{RAS}}$	Row Address Strobe
$\overline{\text{CASL}}/\overline{\text{CASU}}$	Column Address Strobe
$\overline{\text{DT}}/\overline{\text{OE}}$	Data Transfer/Output Enable
$\overline{\text{WB}}/\overline{\text{WE}}$	Write per Bit/Write Enable
DSF1, DSF2	Special Function Control
W1/IO1 ~ W1/IO16	Write Mask/Data IN, OUT

SC	Serial Clock
$\overline{\text{SE}}$	Serial Enable
SO1 ~ SO16	Serial Output
QSF	Special Flag Output
V_{CC}/V_{SS}	Power (5V)/Ground
NC	No Connection

PIN CONNECTION (TOP VIEW)


TC524262/265SF
VCC 1 64 SC
DT/OE 2 63 SE
VSS 3 62 VSS
SO1 4 61 SO16
WI/O1 5 60 WI/O16
SO2 6 59 SO15
WI/O2 7 58 WI/O15
VCC 8 57 VCC
SO3 9 56 SO14
WI/O3 10 55 WI/O14
SO4 11 54 SO13
WI/O4 12 53 WI/O13
VSS 13 52 VSS
SO5 14 51 SO12
WI/O5 15 50 WI/O12
SO6 16 49 SO11
WI/O6 17 48 WI/O11
VCC 18 47 VCC
SO7 19 46 SO10
WI/O7 20 45 WI/O10
SO8 21 44 SO9
WI/O8 22 43 WI/O9
VSS 23 42 VSS
CASL 24 41 DSF1
WB/WE 25 40 DSF2
RAS 26 39 CASU
A8 27 38 QSF
A7 28 37 A0
A6 29 36 A1
A5 30 35 A2
A4 31 34 A3
VCC 32 33 VSS
TC524262/265FT
VCC 1 70 SC
DT/OE 2 69 SE
VSS 3 68 VSS
SO1 4 67 SO16
WI/O1 5 66 WI/O16
SO2 6 65 SO15
WI/O2 7 64 WI/O15
VCC 8 63 VCC
SO3 9 62 SO14
WI/O3 10 61 WI/O14
SO4 11 60 SO13
WI/O4 12 59 WI/O13
VSS 13 58 VSS
SO5 14 57 SO12
WI/O5 15 56 WI/O12
SO6 16 55 SO11
WI/O6 20 51 WI/O11
VCC 21 50 VCC
SO7 22 49 SO10
WI/O7 23 48 WI/O10
SO8 24 47 SO9
WI/O8 25 46 WI/O9
VSS 26 45 VSS
CASL 27 44 DSF1
WB/WE 28 43 DSF2
RAS 29 42 CASU
A8 30 41 QSF
A7 31 40 A0
A6 32 39 A1
A5 33 38 A2
A4 34 37 A3
VCC 35 36 VSS

525mil SSOP (0.8mm pitch)

TOSHIBA AMERICA ELECTRONIC COMPONENTS, INC.

262,144 Word x 16 Bit Multiport DRAM
Silicon Gate CMOS

TC524162SF/FT-60, TC524162SF/FT-70
TC524165SF/FT-60, TC524165SF/FT-70

The TC524162/165 is a 4Mb CMOS multiport memory equipped with a 262,144-word by 16-bit dynamic random access memory (RAM) port and a 512-word by 16-bit static serial access memory (SAM) port. The TC524162/165 supports three types of operations: Random access to and from the RAM port, high speed serial access from the SAM port and transfer of data from any selected row in the RAM to the SAM. To realize a high performance graphic frame buffer system the TC524162/165 features various special operations such as the write-per-bit, the pipelined page mode, the block write and flash write function on the RAM port and the read transfer operations from the RAM to the SAM port. In addition, extended fast page mode is available where an output data remains valid when the $\overline{\text{CAS}}$ is high (TC524165 only). The TC524162/165 is fabricated using Toshiba's CMOS silicon gate process as well as advanced circuit designs to provide low power dissipation and wide operating margins.

FEATURES

		-60	-70
t_{RAC}	$\overline{\text{RAS}}$ Access Time (Max.)	60ns	70ns
t_{CAC}	$\overline{\text{CAS}}$ Access Time (Max.)	15ns	20ns
t_{AA}	Column Address Access Time (Max.)	30ns	35ns
t_{RC}	Cycle Time (Min.)	115ns	130ns
t_{PC}	Page Mode Cycle Time (Min.)	35ns	40ns
t_{SCA}	Serial Access Time (Max.)	15ns	20ns
t_{SCC}	Serial Cycle Time (Min.)	18ns	23ns
t_{RACP}	t_{RAC} in Pipelined Fast Page	85ns	90ns
t_{CAC1}	t_{CAC} in Pipelined Fast Page	15ns	20ns
t_{PCP}	Pipelined Fast Page Mode Cycle Time	30ns	30ns
I_{CC1}	RAM Operating Current (SAM: Standby)	110mA	100mA
I_{CC2A}	SAM Operating Current (RAM: Standby)	60mA	60mA
I_{CC2}	Standby Current	10mA	10mA

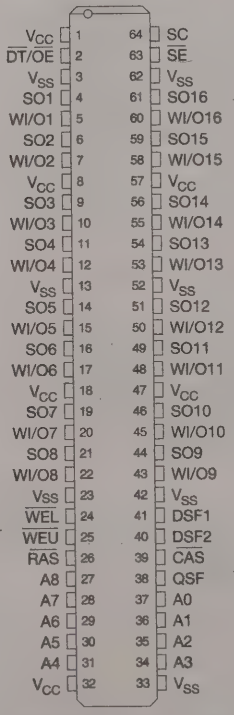
- Single power supply of 5V±10% with a built-in V_{BB} generator
- All inputs and outputs TTL compatible
- Organization
  RAM Port: 262,144 Words x 16 Bits
  SAM Port: 512 Words x 16 Bits
- RAM Port
  Fast Page Mode (TC524162)
  Extended Fast Page Mode (TC524165)
  Read-Modify-Write
  Pipelined Fast Page Mode
  $\overline{\text{CAS}}$ before $\overline{\text{RAS}}$ Auto Refresh
  Hidden Refresh
  $\overline{\text{RAS}}$ only Refresh
  Write per Bit (New/Old Mask Mode)
  Masked Flash Write (New/Old Mask Mode)
  Block Write
  Masked Block Write (New/Old Mask Mode)
  Load Mask Register/Color Register Cycle
  512 refresh cycles/8ms
- SAM Port
  Addressable TAP Capability
  Stop Address (Binary Boundary) Capability
  Fully Static Register
  Single Register/Split Register Mode Capability
- RAM-SAM Transfer
  Read/Real Time Read Transfer
  Split Read Transfer
- Package
  TC524162/165SF: SSOP64-P-525
  TC524162/165FT: TSOP70-P-400

PIN NAMES

A0~A8	Address inputs
$\overline{\text{RAS}}$	Row Address Strobe
$\overline{\text{CAS}}$	Column Address Strobe
$\overline{\text{DT}}/\overline{\text{OE}}$	Data Transfer/Output Enable
$\overline{\text{WEL}}/\overline{\text{WEU}}$	Write per Bit/Write Enable
DSF1, DSF2	Special Function Control
W1/IO1~W16/IO16	Write Mask/Data IN, OUT
SC	Serial Clock
$\overline{\text{SE}}$	Serial Enable
SO1~SO16	Serial /Output
QSF	Special Flag Output
V_{CC}/V_{SS}	Power (5V)/Ground
NC	No Connection

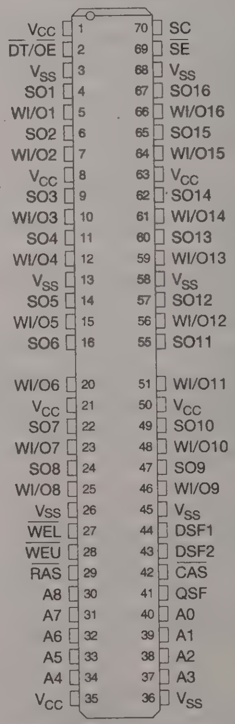
PIN CONNECTION (TOP VIEW)

TC524162/165SF


VCC 1
DT/OE 2
VSS 3
SO1 4
WI/O1 5
SO2 6
WI/O2 7
VCC 8
SO3 9
WI/O3 10
SO4 11
WI/O4 12
VSS 13
SO5 14
WI/O5 15
SO6 16
WI/O6 17
VCC 18
SO7 19
WI/O7 20
SO8 21
WI/O8 22
VSS 23
WEL 24
WEU 25
RAS 26
A8 27
A7 28
A6 29
A5 30
A4 31
VCC 32
64 SC
63 SE
62 VSS
61 SO16
60 WI/O16
59 SO15
58 WI/O15
57 VCC
56 SO14
55 WI/O14
54 SO13
53 WI/O13
52 VSS
51 SO12
50 WI/O12
49 SO11
48 WI/O11
47 VCC
46 SO10
45 WI/O10
44 SO9
43 WI/O9
42 VSS
41 DSF1
40 DSF2
39 CAS
38 QSF
37 A0
36 A1
35 A2
34 A3
33 VSS

525mil SSOP (0.8mm pitch)

TC524162/165FT


VCC 1
DT/OE 2
VSS 3
SO1 4
WI/O1 5
SO2 6
WI/O2 7
VCC 8
SO3 9
WI/O3 10
SO4 11
WI/O4 12
VSS 13
SO5 14
WI/O5 15
SO6 16
WI/O6 20
VCC 21
SO7 22
WI/O7 23
SO8 24
WI/O8 25
VSS 26
WEL 27
WEU 28
RAS 29
A8 30
A7 31
A6 32
A5 33
A4 34
VCC 35
70 SC
69 SE
68 VSS
67 SO16
66 WI/O16
65 SO15
64 WI/O15
63 VCC
62 SO14
61 WI/O14
60 SO13
59 WI/O13
58 VSS
57 SO12
56 WI/O12
55 SO11
51 WI/O11
50 VCC
49 SO10
48 WI/O10
47 SO9
46 WI/O9
45 VSS
44 DSF1
43 DSF2
42 CAS
41 QSF
40 A0
39 A1
38 A2
37 A3
36 VSS

400mil TSOP (0.65mm pitch)

TOSHIBA AMERICA ELECTRONIC COMPONENTS, INC.

1,048,576 Word x 16 Bit Dynamic RAM
Toshiba MOS Digital Integrated Circuit
Silicon Gate CMOS

TC5116160AJ/AFT-60
TC5116160AJ/AFT-70

The TC5116160A is the new generation dynamic RAM organized 1,048,576 words by 16 bits. The TC5116160A utilizes Toshiba's CMOS silicon gate process technology as well as advanced circuit techniques to provide wide operating margins, both internally and to the system user.

Multiplexed address inputs permit the TC5116160A to be packaged in 42 pin plastic SOJ and 50/44 pin plastic TSOP. The package size provides high system bit densities and is compatible with widely available automated testing and insertion equipment. System oriented features include single power supply of 5V±10% tolerance, direct interfacing capability with high performance logic families such as Schottky TTL.

FEATURES

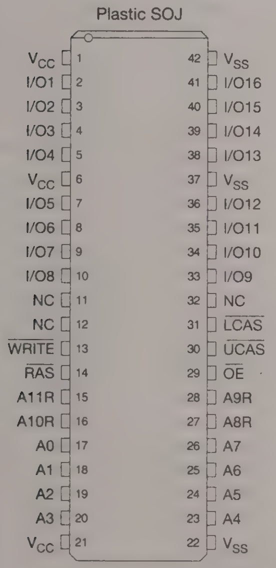
t_{RAC}	$\overline{\text{RAS}}$ Access Time	60ns	70ns
t_{AA}	Column Address Access Time	30ns	35ns
t_{CAC}	$\overline{\text{CAS}}$ Access Time	15ns	20ns
t_{RC}	Cycle Time	110ns	130ns
t_{PC}	Fast Page Mode Cycle Time	40ns	45ns

- ➤ 1,048,576 word by 16 bit organization
- ➤ Fast access time and cycle time
- ➤ Single power supply of 5V±10% with a built-in V_{BB} generator
- ➤ Low Power
  523mW MAX. Operating (TC5116160AJ/AFT-60)
  440mW MAX. Operating (TC5116160AJ/AFT-70)
  5.5mW MAX. Standby
- ➤ Outputs unlatched at cycle end allows two-dimensional chip selection
- ➤ Read-Modify-Write, $\overline{\text{CAS}}$ before $\overline{\text{RAS}}$ refresh, $\overline{\text{RAS}}$-only refresh, Hidden refresh, and Fast Page Mode capability
- ➤ All inputs and outputs TTL compatible
- ➤ 4096 refresh cycles/64ms
- ➤ Package
  TC5116160AJ: SOJ42-P-400
  TC5116160AFT: TSOP50-P-400

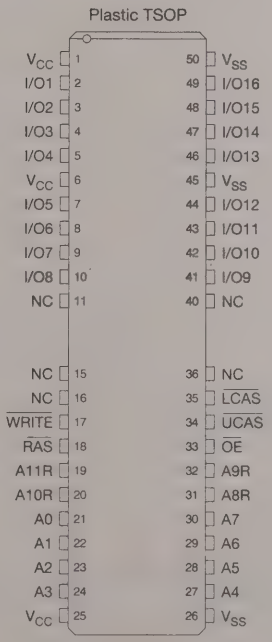
PIN NAMES

A0 ~ A11	Address Inputs
$\overline{\text{RAS}}$	Row Address Strobe
$\overline{\text{UCAS}}$	Column Address Strobe/Upper Byte Control
$\overline{\text{LCAS}}$	Column Address Strobe/Lower Byte Control
$\overline{\text{WRITE}}$	Read/Write Input
$\overline{\text{OE}}$	Output Enable
I/O1 ~ I/O16	Data Input/Output
V_{CC}	Power (+5V)
V_{SS}	Ground
NC	No Connection

PIN CONNECTION (TOP VIEW)


Plastic SOJ

VCC 1
I/O1 2
I/O2 3
I/O3 4
I/O4 5
VCC 6
I/O5 7
I/O6 8
I/O7 9
I/O8 10
NC 11
NC 12
WRITE 13
RAS 14
A11R 15
A10R 16
A0 17
A1 18
A2 19
A3 20
VCC 21
42 VSS
41 I/O16
40 I/O15
39 I/O14
38 I/O13
37 VSS
36 I/O12
35 I/O11
34 I/O10
33 I/O9
32 NC
31 LCAS
30 UCAS
29 OE
28 A9R
27 A8R
26 A7
25 A6
24 A5
23 A4
22 VSS


Plastic TSOP

VCC 1
I/O1 2
I/O2 3
I/O3 4
I/O4 5
VCC 6
I/O5 7
I/O6 8
I/O7 9
I/O8 10
NC 11
NC 15
NC 16
WRITE 17
RAS 18
A11R 19
A10R 20
A0 21
A1 22
A2 23
A3 24
VCC 25
50 VSS
49 I/O16
48 I/O15
47 I/O14
46 I/O13
45 VSS
44 I/O12
43 I/O11
42 I/O10
41 I/O9
40 NC
36 NC
35 LCAS
34 UCAS
33 OE
32 A9R
31 A8R
30 A7
29 A6
28 A5
27 A4
26 VSS

TOSHIBA AMERICA ELECTRONIC COMPONENTS, INC.

Preliminary

1,048,576 Word x 16 Bit Dynamic RAM
Toshiba MOS Digital Integrated Circuit
Silicon Gate CMOS

TC5118160AJ/AFT-70
TC5118160AJ/AFT-80

The TC5118160A is the new generation dynamic RAM organized 1,048,576 words by 16 bits. The TC5118160A utilizes Toshiba's CMOS silicon gate process technology as well as advanced circuit techniques to provide wide operating margins, both internally and to the system user. Multiplexed address inputs permit the TC5118160A to be packaged in 42 pin plastic SOJ and 50/44 pin plastic TSOP. The package size provides high system bit densities and is compatible with widely available automated testing and insertion equipment. System oriented features include single power supply of 5V±10% tolerance, direct interfacing capability with high performance logic families such as Schottky TTL.

FEATURES

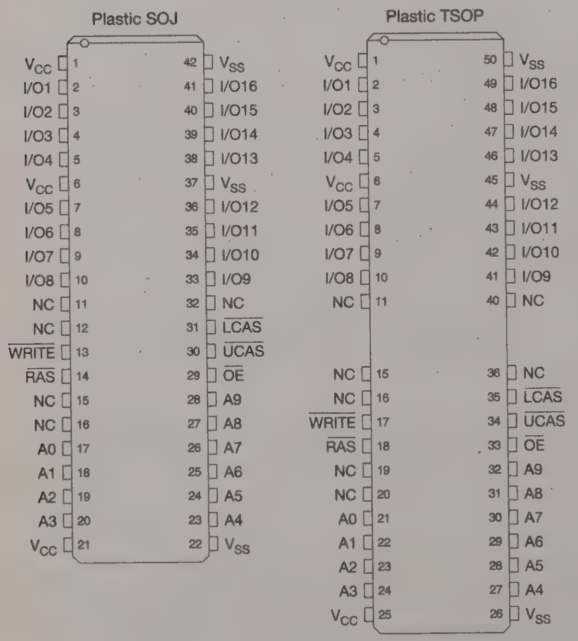
t_{RAC}	$\overline{\text{RAS}}$ Access Time	70ns	80ns
t_{AA}	Column Address Access Time	35ns	40ns
t_{CAC}	$\overline{\text{CAS}}$ Access Time	20ns	20ns
t_{RC}	Cycle Time	130ns	150ns
t_{PC}	Fast Page Mode Cycle Time	45ns	50ns

- 1,048,576 word by 16 bit organization
- Fast access time and cycle time
- Single power supply of 5V±10% with a built-in V_{BB} generator
- Low Power
  770mW MAX. Operating (TC5118160AJ/AFT-70)
  660mW MAX. Operating (TC5118160AJ/AFT-80)
  5.5mW MAX. Standby
- Outputs unlatched at cycle end allows two-dimensional chip selection
- Read-Modify-Write, $\overline{\text{CAS}}$ before $\overline{\text{RAS}}$ refresh, $\overline{\text{RAS}}$-only refresh, Hidden refresh, and Fast Page Mode capability
- All inputs and outputs TTL compatible
- 1024 refresh cycles/16ms
- Package
  TC5118160AJ: SOJ42-P-400
  TC5118160AFT: TSOP50-P-400

PIN NAMES

A0 ~ A9	Address Inputs
$\overline{\text{RAS}}$	Row Address Strobe
$\overline{\text{UCAS}}$	Column Address Strobe/Upper Byte Control
$\overline{\text{LCAS}}$	Column Address Strobe/Lower Byte Control
$\overline{\text{WRITE}}$	Read/Write Input
$\overline{\text{OE}}$	Output Enable
I/O1 ~ I/O16	Data Input/Output
V_{CC}	Power (+5V)
V_{SS}	Ground
NC	No Connection

PIN CONNECTION (TOP VIEW)


Plastic SOJ
VCC 1 42 VSS
I/O1 2 41 I/O16
I/O2 3 40 I/O15
I/O3 4 39 I/O14
I/O4 5 38 I/O13
VCC 6 37 VSS
I/O5 7 36 I/O12
I/O6 8 35 I/O11
I/O7 9 34 I/O10
I/O8 10 33 I/O9
NC 11 32 NC
NC 12 31 LCAS
WRITE 13 30 UCAS
RAS 14 29 OE
NC 15 28 A9
NC 16 27 A8
A0 17 26 A7
A1 18 25 A6
A2 19 24 A5
A3 20 23 A4
VCC 21 22 VSS
Plastic TSOP
VCC 1 50 VSS
I/O1 2 49 I/O16
I/O2 3 48 I/O15
I/O3 4 47 I/O14
I/O4 5 46 I/O13
VCC 6 45 VSS
I/O5 7 44 I/O12
I/O6 8 43 I/O11
I/O7 9 42 I/O10
I/O8 10 41 I/O9
NC 11 40 NC
NC 15 36 NC
NC 16 35 LCAS
WRITE 17 34 UCAS
RAS 18 33 OE
NC 19 32 A9
NC 20 31 A8
A0 21 30 A7
A1 22 29 A6
A2 23 28 A5
A3 24 27 A4
VCC 25 26 VSS

Preliminary

2,097,152 Word x 8 Bit Dynamic RAM
Toshiba MOS Digital Integrated Circuit
Silicon Gate CMOS

TC5117800ANJ/ANT-60
TC5117800ANJ/ANT-70

The TC5117800A series is Toshiba's new generation dynamic RAM organized 2,097,152 words by 8 bits. The TC5117800A series utilizes Toshiba's CMOS silicon gate process technology as well as advanced circuit techniques to provide wide operating margins, both internally and to the system user.

Multiplexed address inputs permit the TC5117800ANJ/ANT to be packaged in 28 pin plastic SOJ and 28 pin plastic TSOP. The package size provides high system bit densities and is compatible with widely available automated testing and insertion equipment. System oriented features include single power supply of 5V±10% tolerance, direct interfacing capability with high performance logic families such as Schottky TTL.

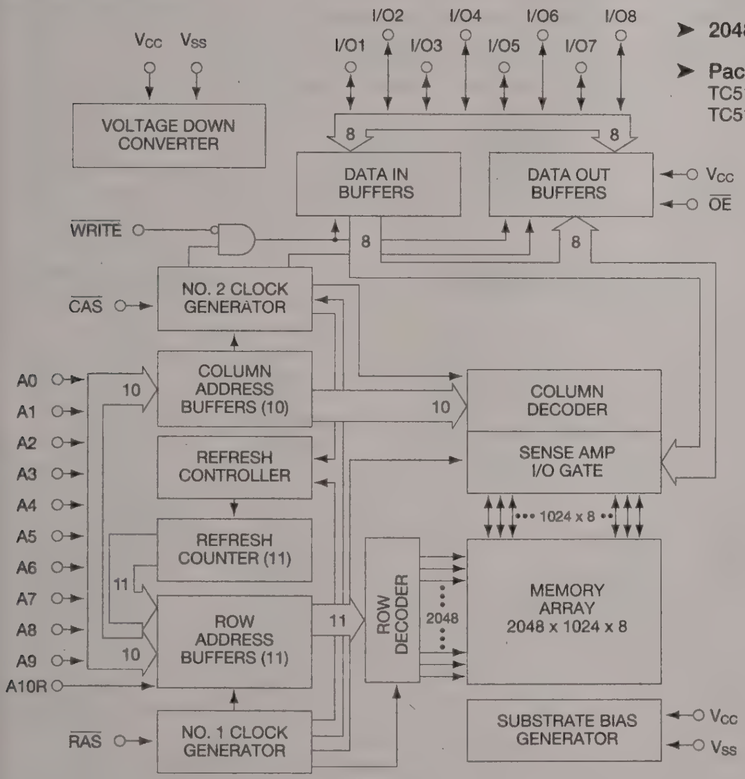
FEATURES

- 2,097,152 word by 8 bit organization
- Fast access time and cycle time:

t_{RAC}	$\overline{\text{RAS}}$ Access Time	60ns	70ns
t_{AA}	Column Address Access Time	30ns	35ns
t_{CAC}	$\overline{\text{CAS}}$ Access Time	15ns	20ns
t_{RC}	Cycle Time	110ns	130ns
t_{PC}	Fast Page Mode Cycle Time	40ns	45ns

- Single power supply of 5V±10% with a built-in V_{BB} generator
- Low Power
  633mW MAX. Operating (60ns Version)
  523mW MAX. Operating (70ns Version)
  5.5mW MAX. Standby
- Outputs unlatched at cycle end allow two-dimensional chip selection
- Read-Modify-Write, $\overline{\text{CAS}}$ before $\overline{\text{RAS}}$ refresh, $\overline{\text{RAS}}$-only refresh, Hidden refresh, Fast Page Mode and Test Mode capability
- All inputs and outputs TTL compatible
- 2048 refresh cycles/32ms
- Package
  TC5117800ANJ: SOJ28-P-400C
  TC5117800ANT: TSOP-28-P-400

BLOCK DIAGRAM


Vcc
Vss
VOLTAGE DOWN CONVERTER
I/O1
I/O2
I/O3
I/O4
I/O5
I/O6
I/O7
I/O8
8
8
DATA IN BUFFERS
DATA OUT BUFFERS
Vcc
OE
WRITE
8
8
NO. 2 CLOCK GENERATOR
CAS
A0
A1
A2
A3
A4
A5
A6
A7
A8
A9
A10R
10
COLUMN ADDRESS BUFFERS (10)
10
COLUMN DECODER
SENSE AMP I/O GATE
1024 x 8
REFRESH CONTROLLER
REFRESH COUNTER (11)
11
ROW ADDRESS BUFFERS (11)
10
11
ROW DECODER
2048
MEMORY ARRAY 2048 x 1024 x 8
SUBSTRATE BIAS GENERATOR
Vcc
Vss
RAS
NO. 1 CLOCK GENERATOR

TOSHIBA AMERICA ELECTRONIC COMPONENTS, INC.

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NORTHWEST	SOUTHWEST	CENTRAL	NORTHEAST	SOUTHEAST
Sunnyvale, CA (408) 737-9844 FAX (408) 737-9905	Irvine, CA (714) 453-0224 FAX (714) 453-0125	Chicago, IL (708) 945-1500 FAX (708) 945-1044	Boston, MA (617) 224-0074 FAX (617) 224-1096	Atlanta, GA (404) 368-0203 FAX (404) 368-0075
	Denver, CO (303) 220-9848 FAX (303) 220-9856	Dallas, TX (214) 480-0470 FAX (214) 235-4114	Edison, NJ (908) 248-8070 FAX (908) 248-8030	Orlando, FL (407) 332-0966 FAX (407) 339-3777

Toshiba.
World Leader in Memory: Static RAM.

Preliminary

524,288 Word x 8 Bit Static RAM
Silicon Gate CMOS

TC554002PL/FL/FTL/TRL-55, -70, -85, -10

The TC554002PL is a 4,194,304 bit static random access memory organized as 524,288 words by 8 bits and operated from a single 5V supply. Advanced circuit techniques provide both high speed and low power features with an operating current of 5mA/MHz (Typ.) and a minimum cycle time of 55ns. The TC554002PL has two control inputs. The chip enable input ($\overline{\text{CE}}$) allows for device selection and data retention control. When $\overline{\text{CE}}$ is a logical high, the device is placed in a low power standby mode in which the standby current is 100µA. The output enable input ($\overline{\text{OE}}$) provides fast memory access. The TC554002PL is suitable for use in microprocessor applications where high speed, low power, and battery backup are required.

The TC554002PL is offered in a dual-in-line 32 pin standard plastic package, small outline plastic package and thin small outline plastic package (forward or reverse type).

FEATURES

ACCESS TIME (Max.)	TC554002PL/FL/FTL/TRL			
	-55	-70	-85	-10
Access Time	55ns	70ns	85ns	100ns
$\overline{\text{CE}}$ Access Time	55ns	70ns	85ns	100ns
$\overline{\text{OE}}$ Access Time	30ns	35ns	45ns	50ns

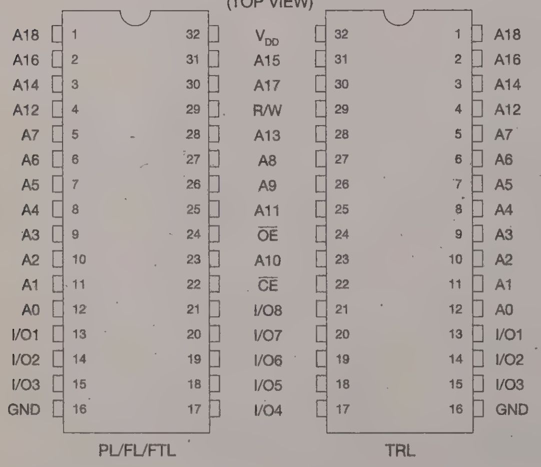
- ➤ Low power dissipation:
  - Operation: 80mA (MAX.)
  - Standby: 100µA (MAX.)
- ➤ Single power supply: 5V ± 10%
- ➤ Data retention supply voltage: 2.0 ~ 5.5V
- ➤ All inputs and outputs TTL compatible
- ➤ Package:
  - TC554002PL: DIP32-P-600
  - TC554002FL: SOP32-P-525
  - TC554002FTL: TSOP32-P-400
  - TC554002TRL: TSOP32-P-400A

PIN NAMES

A0~A18	Address Inputs
R/W	Read/Write Control Input
$\overline{\text{OE}}$	Output Enable Input
$\overline{\text{CE}}$	Chip Enable Input
I/O1~I/O8	Data Input/Output
V_{DD}	Power
GND	Ground

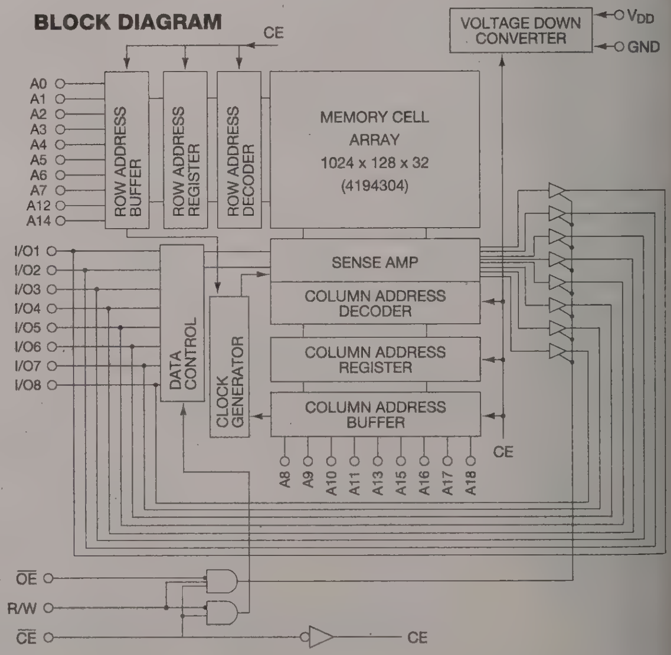
PIN CONNECTION

(TOP VIEW)



A18 1
A16 2
A14 3
A12 4
A7 5
A6 6
A5 7
A4 8
A3 9
A2 10
A1 11
A0 12
I/O1 13
I/O2 14
I/O3 15
GND 16
32 V_DD
31 A15
30 A17
29 R/W
28 A13
27 A8
26 A9
25 A11
24 OE
23 A10
22 CE
21 I/O8
20 I/O7
19 I/O6
18 I/O5
17 I/O4
PL/FL/FTL
TRL

BLOCK DIAGRAM



CE
VOLTAGE DOWN CONVERTER
V_DD
GND
A0
A1
A2
A3
A4
A5
A6
A7
A12
A14
ROW ADDRESS BUFFER
ROW ADDRESS REGISTER
ROW ADDRESS DECODER
MEMORY CELL ARRAY
1024 x 128 x 32
(4194304)
I/O1
I/O2
I/O3
I/O4
I/O5
I/O6
I/O7
I/O8
DATA CONTROL
CLOCK GENERATOR
SENSE AMP
COLUMN ADDRESS DECODER
COLUMN ADDRESS REGISTER
COLUMN ADDRESS BUFFER
A8
A9
A10
A11
A13
A15
A16
A17
A18
CE
OE
R/W
CE
CE

TOSHIBA AMERICA ELECTRONIC COMPONENTS, INC.

32,768 Word x 8 Bit CMOS Static RAM
Silicon Gate CMOS

TC55V328J-20
TC55V328J-25
TC55V328J-35

The TC55V328J is a 262,144 bit high speed static random access memory organized as 32,768 words by 8 bits and operated from a single 3.3-volt supply. Toshiba's CMOS technology and advanced circuit design enable low voltage high speed operation.

The TC55V328J features a low power dissipation standby mode when the SRAM is deselected using chip enable ($\overline{\text{CE}}$), and has an output enable input ($\overline{\text{OE}}$) for fast memory access.

The TC55V328J is suitable for use in portable computer cache memory or other applications where high speed and low voltage operation is required. All inputs and outputs are LVTTL compatible.

The TC55V328J is available in a 28 pin, 300mil SOJ package suitable for high density assembly.

FEATURES

- Fast access time:

TC55V328J-20	20ns (MAX.)
TC55V328J-25	25ns (MAX.)
TC55V328J-35	35ns (MAX.)

- Low power dissipation:

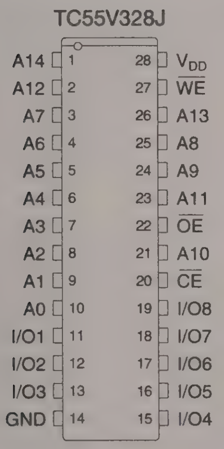
Operation:	TC55V328J-20	70mA (MAX.)
	TC55V328J-25	70mA (MAX.)
	TC55V328J-35	70mA (MAX.)
Standby:		300μA (MAX.)

- Single power supply: 3.3V ± 0.3V
- Fully static operation
- Inputs and outputs LVTTL compatible
- Output buffer control: $\overline{\text{OE}}$
- Package:
  TC55V328J : SOJ28-P-300A

PIN NAMES

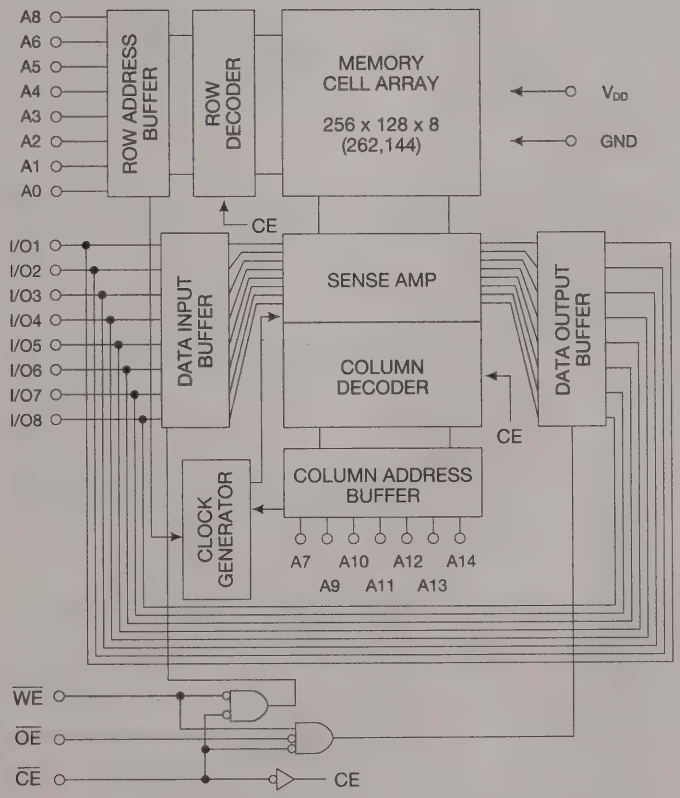
A0 ~ A14	Address Inputs
I/O1 ~ I/O8	Data Inputs/Outputs
$\overline{\text{CE}}$	Chip Enable Input
$\overline{\text{WE}}$	Write Enable Input
$\overline{\text{OE}}$	Output Enable Input
V_{DD}	Power (+ 3.3V)
GND	Ground

PIN CONNECTION (TOP VIEW)


TC55V328J
A14 1
A12 2
A7 3
A6 4
A5 5
A4 6
A3 7
A2 8
A1 9
A0 10
I/O1 11
I/O2 12
I/O3 13
GND 14
28 V_DD
27 WE
26 A13
25 A8
24 A9
23 A11
22 OE
21 A10
20 CE
19 I/O8
18 I/O7
17 I/O6
16 I/O5
15 I/O4

(SOJ)

BLOCK DIAGRAM


A8
A6
A5
A4
A3
A2
A1
A0
ROW ADDRESS BUFFER
ROW DECODER
MEMORY CELL ARRAY
256 x 128 x 8
(262,144)
V_DD
GND
CE
I/O1
I/O2
I/O3
I/O4
I/O5
I/O6
I/O7
I/O8
DATA INPUT BUFFER
SENSE AMP
COLUMN DECODER
DATA OUTPUT BUFFER
CE
CLOCK GENERATOR
COLUMN ADDRESS BUFFER
A7
A10
A12
A14
A9
A11
A13
WE
OE
CE
CE

TOSHIBA AMERICA ELECTRONIC COMPONENTS, INC.

262,144 Word x 4 Bit Synchronous Static RAM
Silicon Gate BiCMOS

TC55BS4258J-10
TC55BS4258J-12

The TC55BS4258J is a 1,048,576 bit synchronous static random access memory fabricated using BiCMOS technology and organized as 262,144 words by 4 bits.

Designed for pipelined architectures, this device has internal input and output registers which are triggered on the positive edge of an external clock (CLK). For read cycles, data is output one clock cycle after the address is presented. Write operations are internally self-timed and are initiated on the positive edge of CLK. A write cycle pass-through feature allows outputs to follow inputs with a one cycle delay if output is enabled. All inputs and outputs are TTL compatible.

The TC55BS4258J is available in a 36 pin, 400mil SOJ package suitable for high density assembly.

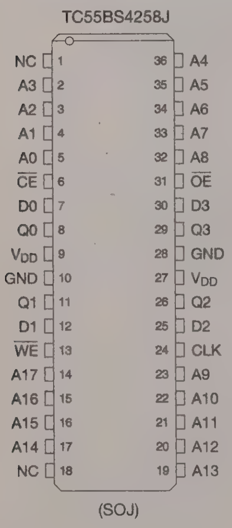
FEATURES

- Fast cycle time:
  TC55BS4258J-10: 10ns (MAX.)
  TC55BS4258J-12: 12ns (MAX.)
- Fast clock access time:
  TC55BS4258J-10: 5ns (MAX.)
  TC55BS4258J-12: 6ns (MAX.)
- Input and output registers for synchronous operation
- Pass-through mode in write cycle
- Single power supply: 5V±10%
- Separate data inputs and outputs
- Inputs and outputs TTL compatible
- Package:
  JEDEC standard pinout
  36 pin, 400mil SOJ
  (SOJ36-P-400)

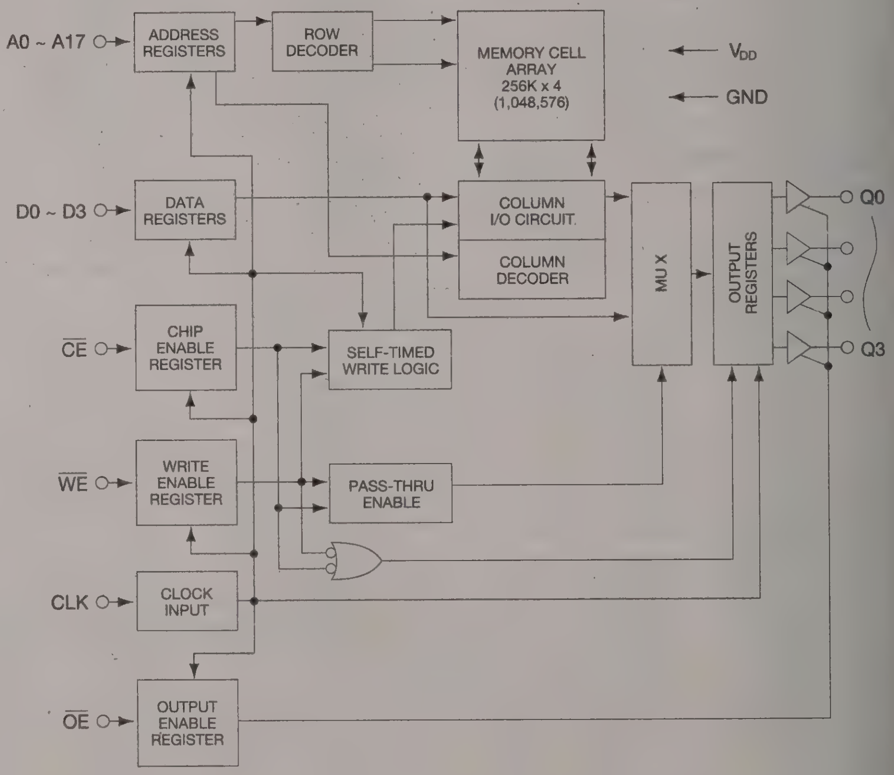
PIN NAMES

A0 ~ A17	Address Inputs
D0 ~ D3	Data Inputs
Q0 ~ Q3	Data Outputs
CLK	Clock Input
$\overline{\text{CE}}$	Chip Enable Input
$\overline{\text{WE}}$	Write Enable Input
$\overline{\text{OE}}$	Output Enable Input
V_{DD}	Power
GND	Ground
NC	No Connection

PIN CONNECTION (TOP VIEW)


TC55BS4258J
NC 1
A3 2
A2 3
A1 4
A0 5
$\overline{\text{CE}}$ 6
D0 7
Q0 8
V_{DD} 9
GND 10
Q1 11
D1 12
$\overline{\text{WE}}$ 13
A17 14
A16 15
A15 16
A14 17
NC 18
36 A4
35 A5
34 A6
33 A7
32 A8
31 $\overline{\text{OE}}$
30 D3
29 Q3
28 GND
27 V_{DD}
26 Q2
25 D2
24 CLK
23 A9
22 A10
21 A11
20 A12
19 A13
(SOJ)

BLOCK DIAGRAM


A0 ~ A17
ADDRESS REGISTERS
ROW DECODER
MEMORY CELL ARRAY 256K x 4 (1,048,576)
V_{DD}
GND
D0 ~ D3
DATA REGISTERS
COLUMN I/O CIRCUIT
COLUMN DECODER
MU X
OUTPUT REGISTERS
Q0
Q3
$\overline{\text{CE}}$
CHIP ENABLE REGISTER
SELF-TIMED WRITE LOGIC
$\overline{\text{WE}}$
WRITE ENABLE REGISTER
PASS-THRU ENABLE
CLK
CLOCK INPUT
$\overline{\text{OE}}$
OUTPUT ENABLE REGISTER

TOSHIBA AMERICA ELECTRONIC COMPONENTS, INC.

131,072 Word x 8 Bit Synchronous Static RAM with input registers, output registers and pass-through function Silicon Gate BiCMOS

TC55BS8128J-10
TC55BS8128J-12

The TC55BS8128J is a 1,048,576 bit synchronous static random access memory fabricated using BiCMOS technology and organized as 131,072 words by 8 bits.

Designed for pipelined architectures, this device has internal input and output registers which are triggered on the positive edge of an external clock (CLK). For read cycles, data is output one clock cycle after the address is presented. Write operations are internally self-timed and are initiated on the positive edge of CLK. A write cycle pass-through feature allows outputs to follow inputs with a one cycle delay. All inputs and outputs are TTL compatible.

The TC55BS8128J is available in a 40 pin, 400mil SOJ package suitable for high density assembly.

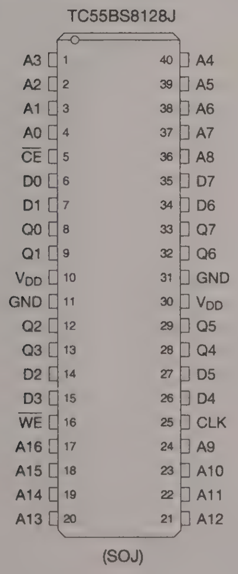
FEATURES

- Fast cycle time:
  TC55BS8128J-10: 10ns (MAX.)
  TC55BS8128J-12: 12ns (MAX.)
- Fast clock access time:
  TC55BS8128J-10: 5ns (MAX.)
  TC55BS8128J-12: 6ns (MAX.)
- Input and output registers for synchronous operation
- Pass-through mode in write cycle
- Single power supply: 5V±10%
- Separate data inputs and outputs
- Inputs and outputs TTL compatible
- Package:
  JEDEC standard pinout
  40 pin, 400mil SOJ
  (SOJ40-P-400)

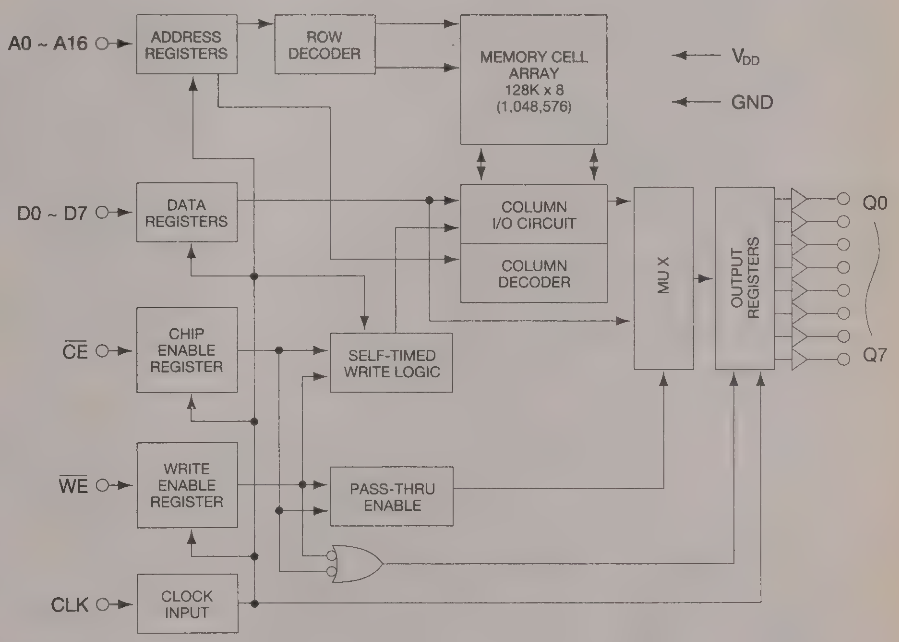
PIN NAMES

A0 ~ A16	Address Inputs
D0 ~ D7	Data Inputs
Q0 ~ Q7	Data Outputs
CLK	Clock Input
$\overline{\text{CE}}$	Chip Enable Input
$\overline{\text{WE}}$	Write Enable Input
V_{DD}	Power
GND	Ground

PIN CONNECTION (TOP VIEW)


TC55BS8128J
A3 1
A2 2
A1 3
A0 4
CE 5
D0 6
D1 7
Q0 8
Q1 9
VDD 10
GND 11
Q2 12
Q3 13
D2 14
D3 15
WE 16
A16 17
A15 18
A14 19
A13 20
40 A4
39 A5
38 A6
37 A7
36 A8
35 D7
34 D6
33 Q7
32 Q6
31 GND
30 VDD
29 Q5
28 Q4
27 D5
26 D4
25 CLK
24 A9
23 A10
22 A11
21 A12
(SOJ)

BLOCK DIAGRAM


A0 ~ A16
ADDRESS REGISTERS
ROW DECODER
MEMORY CELL ARRAY 128K x 8 (1,048,576)
VDD
GND
D0 ~ D7
DATA REGISTERS
COLUMN I/O CIRCUIT
COLUMN DECODER
MU X
OUTPUT REGISTERS
Q0
Q7
CE
CHIP ENABLE REGISTER
SELF-TIMED WRITE LOGIC
WE
WRITE ENABLE REGISTER
PASS-THRU ENABLE
CLK
CLOCK INPUT

TOSHIBA AMERICA ELECTRONIC COMPONENTS, INC.

131,072 Word x 8 Bit Synchronous Static RAM with input registers, output registers Silicon Gate BiCMOS

TC55BS8125J-10
TC55BS8125J-12

The TC55BS8125J is a 1,048,576 bit synchronous static random access memory fabricated using BiCMOS technology and organized as 131,072 words by 8 bits.

Designed for pipelined architectures, this device has internal input and output registers which are triggered on the positive edge of an external clock (CLK). For read cycles, data is output one clock cycle after the address is presented. Write operations are internally self-timed and are initiated on the positive edge of CLK. All inputs and outputs are TTL compatible.

The TC55BS8125J is available in a 36 pin, 400mil SOJ package suitable for high density assembly.

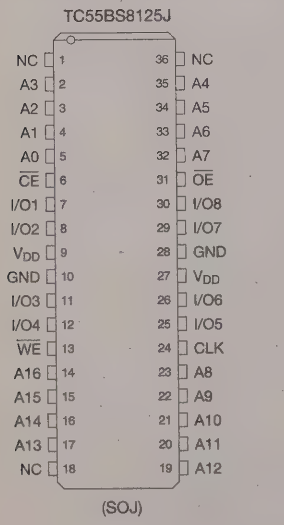
FEATURES

- Fast cycle time:
  TC55BS8125J-10: 10ns (MAX.)
  TC55BS8125J-12: 12ns (MAX.)
- Fast clock access time:
  TC55BS8125J-10: 5ns (MAX.)
  TC55BS8125J-12: 6ns (MAX.)
- Input and output registers for synchronous operation
- Single power supply: 5V±10%
- Common data I/O
- Inputs and outputs TTL compatible
- Package:
  JEDEC standard pinout
  36 pin, 400mil SOJ
  (SOJ36-P-400)

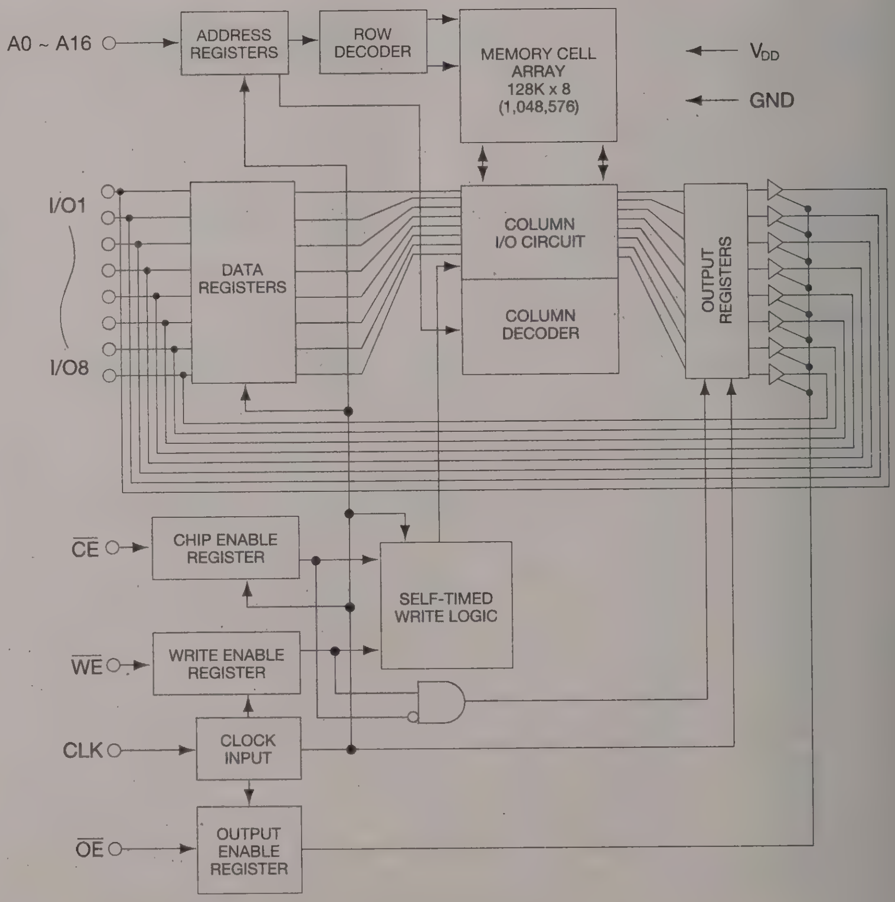
PIN NAMES

A0 ~ A16	Address Inputs
I/O1 ~ I/O8	Data Input and Output
CLK	Clock Input
$\overline{\text{CE}}$	Chip Enable Input
$\overline{\text{WE}}$	Write Enable Input
$\overline{\text{OE}}$	Output Enable Input
V_{DD}	Power
GND	Ground
NC	No Connection

PIN CONNECTION (TOP VIEW)


TC55BS8125J
NC 1
A3 2
A2 3
A1 4
A0 5
CE 6
I/O1 7
I/O2 8
VDD 9
GND 10
I/O3 11
I/O4 12
WE 13
A16 14
A15 15
A14 16
A13 17
NC 18
36 NC
35 A4
34 A5
33 A6
32 A7
31 OE
30 I/O8
29 I/O7
28 GND
27 VDD
26 I/O6
25 I/O5
24 CLK
23 A8
22 A9
21 A10
20 A11
19 A12
(SOJ)

BLOCK DIAGRAM


A0 ~ A16
ADDRESS REGISTERS
ROW DECODER
MEMORY CELL ARRAY 128K x 8 (1,048,576)
VDD
GND
I/O1
I/O8
DATA REGISTERS
COLUMN I/O CIRCUIT
COLUMN DECODER
OUTPUT REGISTERS
CE
CHIP ENABLE REGISTER
SELF-TIMED WRITE LOGIC
WE
WRITE ENABLE REGISTER
CLK
CLOCK INPUT
OE
OUTPUT ENABLE REGISTER

TOSHIBA AMERICA ELECTRONIC COMPONENTS, INC.

4,194,304 Word x 1 Bit/1,048,576 Word x 4 Bit CMOS Static RAM
Silicon Gate CMOS

TC551402J-20
TC551402J-25
TC551402J-30

The TC551402J is a 4,194,304 bit high speed CMOS static random access memory. It is configurable to an organization of either 4,194,304 words by 1 bit or 1,048,576 words by 4 bits and operates from a single 5V supply. Toshiba's CMOS technology and advanced circuit design enable high speed operation.

The TC551402J features a low power dissipation standby mode when the SRAM is deselected using chip enable ($\overline{CE}$), and has output enable ($\overline{OE}$) for fast memory access. It is suitable for use in high speed applications such as cache memory, high speed storage, and main memory. All inputs and outputs are TTL compatible.

The TC551402J is available in a 32 pin, 400mil SOJ package suitable for high density assembly.

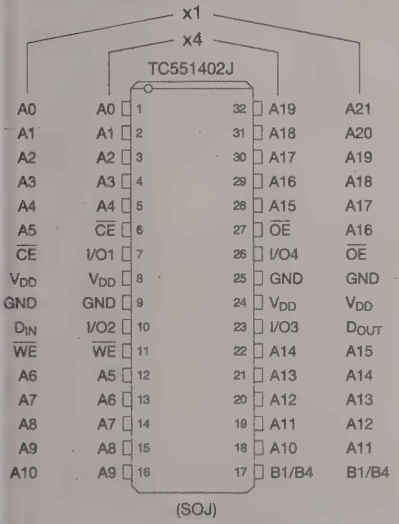
FEATURES

- Fast access time:
  TC551402J-20: 20ns (MAX.)
  TC551402J-25: 25ns (MAX.)
  TC551402J-30: 30ns (MAX.)
- Low power dissipation:
  Operation:
  TC551402J-20: 160mA (MAX.)
  TC551402J-25: 160mA (MAX.)
  TC551402J-30: 150mA (MAX.)
  Standby: 10mA (MAX.)
- Single power supply: 5V±10%
- Fully static operation
- Inputs and outputs TTL compatible
- Separate data I/O (x1 mode), Common data I/O (x4 mode)
- Output buffer control: $\overline{OE}$
- Package:
  32 pin, 400mil SOJ
  (SOJ32-P-400A)

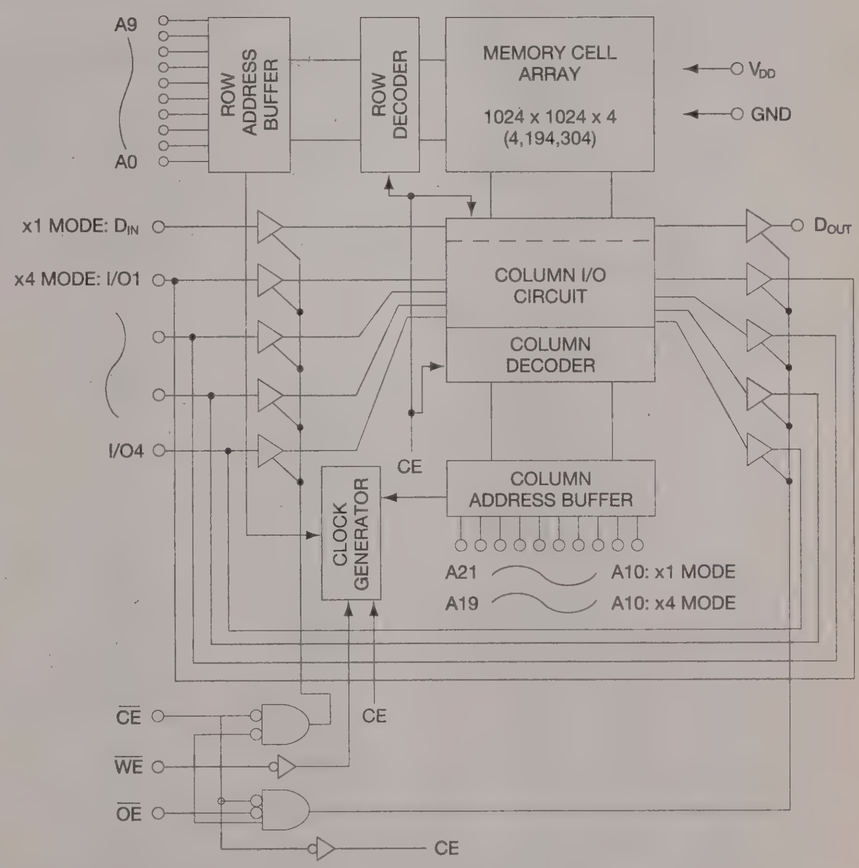
PIN NAMES

A0 ~ A21	Address Inputs
I/O1 ~ I/O4	Data Inputs/Outputs
D_{IN}	Data Input
D_{OUT}	Data Output
$\overline{CE}$	Chip Enable Input
$\overline{WE}$	Write Enable Input
$\overline{OE}$	Output Enable Input
V_{DD}	Power (+5V)
GND	Ground
B1/B4	Bits: x1, x4

PIN CONNECTION (TOP VIEW)


x1
x4
TC551402J
A0 A0 1 32 A19 A21
A1 A1 2 31 A18 A20
A2 A2 3 30 A17 A19
A3 A3 4 29 A16 A18
A4 A4 5 28 A15 A17
A5 $\overline{CE}$ 6 27 $\overline{OE}$ A16
$\overline{CE}$ I/O1 7 26 I/O4 $\overline{OE}$
V_{DD} V_{DD} 8 25 GND GND
GND GND 9 24 V_{DD} V_{DD}
D_{IN} I/O2 10 23 I/O3 D_{OUT}
$\overline{WE}$ $\overline{WE}$ 11 22 A14 A15
A6 A5 12 21 A13 A14
A7 A6 13 20 A12 A13
A8 A7 14 19 A11 A12
A9 A8 15 18 A10 A11
A10 A9 16 17 B1/B4 B1/B4
(SOJ)

BLOCK DIAGRAM


A9
A0
ROW ADDRESS BUFFER
ROW DECODER
MEMORY CELL ARRAY
1024 x 1024 x 4
(4,194,304)
V_{DD}
GND
x1 MODE: D_{IN}
x4 MODE: I/O1
I/O4
COLUMN I/O CIRCUIT
COLUMN DECODER
D_{OUT}
CE
CLOCK GENERATOR
COLUMN ADDRESS BUFFER
A21 A10: x1 MODE
A19 A10: x4 MODE
$\overline{CE}$
$\overline{WE}$
$\overline{OE}$
CE
CE

TOSHIBA AMERICA ELECTRONIC COMPONENTS, INC.

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Toshiba Mask ROM.
Economy at the Leading Edge.

Preliminary

16Mb (1M Words x 16 Bits/2M Words x 8 Bits) CMOS Mask ROM
Toshiba MOS Integrated Circuit
Silicon Gate CMOS

TC5316210BP/BF/BFT

The TC5316210BP/BF/BFT is a 16,777,216 bit read-only memory organized as 1,048,576 words by 16 bits when $\overline{\text{BYTE}}$ is logical high, and organized as 2,097,152 words by 8 bits when $\overline{\text{BYTE}}$ is logical low.

The TC5316210BP/BF/BFT is highly suitable for use as program memory, data memory or character generation.

Page read mode allows two to eight words of 16 bit data to be quickly read in the same page. $\overline{\text{CE}}$ and address lines A3..A19 must not change during a page read. Page read access time is 60ns.

The TC5316210BP/BF/BFT is packaged in a standard 600mil 42 pin DIP, 600mil 44 pin SOP, or 400mil 44 pin TYPE II TSOP.

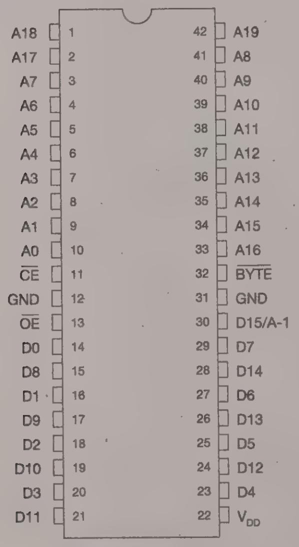
PIN NAMES

A0~A19	Address Inputs
D0~D14	Data Outputs
$\overline{\text{CE}}$	Chip Enable Input
$\overline{\text{OE}}$	Output Enable Input
D15/A-1	Data Output/Address Input
$\overline{\text{BYTE}}$	Word, Byte Selection Input
V_{DD}	Power Supply
GND	Ground
NC	No Connection

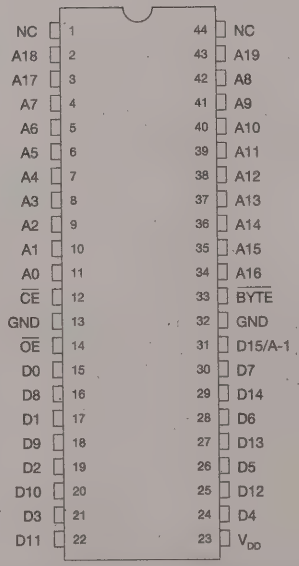
FEATURES

- Single 5V Power Supply
- Access Time
  Normal Mode: 150ns (Max.)
  Page Access Mode: 60ns (Max.)
- Power Dissipation
  Operating Current: 150mA (Max.)
  Standby Current: 1mA (Max.)
- Fully Static Operation
- All inputs and outputs TTL compatible
- Three State Outputs
- TC5316210BP: DIP42-P-600
- TC5316210BF: SOP44-P-600
- TC5316210BFT: TSOP44-P-400

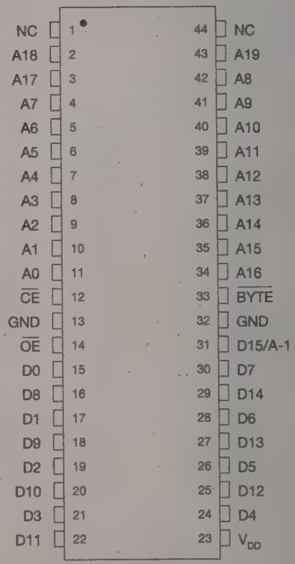
PIN CONNECTION (TOP VIEW)


A18 1 42 A19
A17 2 41 A8
A7 3 40 A9
A6 4 39 A10
A5 5 38 A11
A4 6 37 A12
A3 7 36 A13
A2 8 35 A14
A1 9 34 A15
A0 10 33 A16
CE 11 32 BYTE
GND 12 31 GND
OE 13 30 D15/A-1
D0 14 29 D7
D8 15 28 D14
D1 16 27 D6
D9 17 26 D13
D2 18 25 D5
D10 19 24 D12
D3 20 23 D4
D11 21 22 VDD

TC5316210BP


NC 1 44 NC
A18 2 43 A19
A17 3 42 A8
A7 4 41 A9
A6 5 40 A10
A5 6 39 A11
A4 7 38 A12
A3 8 37 A13
A2 9 36 A14
A1 10 35 A15
A0 11 34 A16
CE 12 33 BYTE
GND 13 32 GND
OE 14 31 D15/A-1
D0 15 30 D7
D8 16 29 D14
D1 17 28 D6
D9 18 27 D13
D2 19 26 D5
D10 20 25 D12
D3 21 24 D4
D11 22 23 VDD

TC5316210BF


NC 1 44 NC
A18 2 43 A19
A17 3 42 A8
A7 4 41 A9
A6 5 40 A10
A5 6 39 A11
A4 7 38 A12
A3 8 37 A13
A2 9 36 A14
A1 10 35 A15
A0 11 34 A16
CE 12 33 BYTE
GND 13 32 GND
OE 14 31 D15/A-1
D0 15 30 D7
D8 16 29 D14
D1 17 28 D6
D9 18 27 D13
D2 19 26 D5
D10 20 25 D12
D3 21 24 D4
D11 22 23 VDD

TC5316210BFT

TOSHIBA AMERICA ELECTRONIC COMPONENTS, INC.

Preliminary

16Mb (2M Words x 8 Bits) CMOS NAND EEPROM **TC5816FT/TR**
Toshiba MOS Integrated Circuit
Silicon Gate CMOS

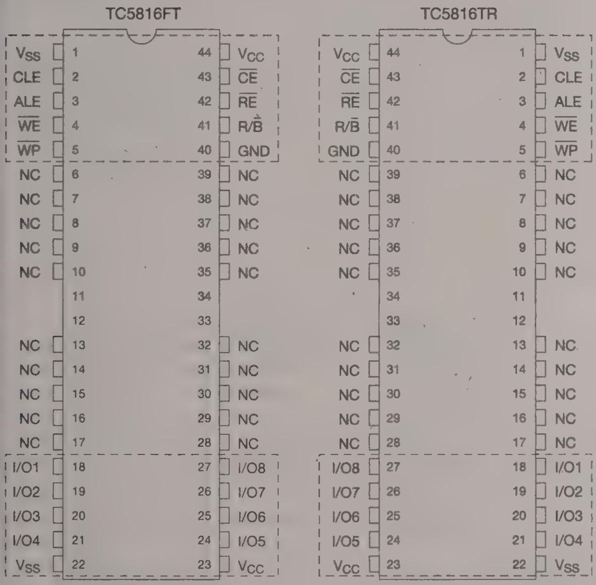
The TC5816FT/TR device is a single 5 volt 16.5Mb NAND Electrically Erasable and Programmable Read Only Memory (NAND EEPROM) organized as 264 bytes x 16 pages x 512 blocks. The device has a 264-byte static register which allows program and read data to be transferred between the register and the memory cell array in 264-byte increments. The erase operation is implemented in either a single block unit (4KB + 128 bytes: 264 bytes x 16 pages) or multiple blocks at the same time.

The TC5816FT/TR is a serial type of memory device which utilizes the I/O pins for both address and data input/output as well as command inputs. The erase and program operations are automatically executed making the device most suitable for applications such as solid state file storage, voice recording, image file memory for still cameras and other systems which require large density, non-volatile memory data storage.

PIN ASSIGNMENT

CLE	Command Latch Enable
ALE	Address Latch Enable
$\overline{CE}$	Chip Enable
$\overline{WE}$	Write Enable
$\overline{RE}$	Read Enable
$\overline{WP}$	Write Protect
I/O 1-8	Input/Output
V_{CC}/V_{SS}	5V/GND

PIN CONNECTION (TOP VIEW)



FEATURES

- **Organization**

Memory cell array:	264 bytes x 8K pages
Register:	264 bytes
Page Size:	(256+8) bytes
Block Size:	(4K+128) bytes

- **User Features**
  Auto page programming
  Auto block multi-block erase
  Multiplexed address and data lines
  Additional memory bits on each page for error correction, etc.
  Separate Ready/Busy pin
  Protection pin to prevent accidential Write/Erase
  Suspend/resume interrupt capability
  Device status read bits available

- **Access Time**

Cell array-register:	25μs max.
Serial access:	80ns max.

- **Mode Control**
  Serial input/output
  Command control

- **W/E Cycle: 10^6 cycles (target)**

- **Power supply: V_{CC} = 5V ± 5%**

- **Program/Erase Time**

Program:	Average 300μs/264 bytes
Block Erase:	Typical 6ms

- **Operating Current**

Read (80ns cycle):	15mA typ.
Program (ave.):	40mA typ.
Erase (ave.):	20mA typ.
Standby:	100μA

- **Package: 400 mil TSOP Type II**

T5816FT:	TSOP44-P-400B
TC5816TR:	TSOP44-P-400C

TOSHIBA AMERICA ELECTRONIC COMPONENTS, INC.

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Toshiba.
Wide Selection of Processors.

4-Bit Microcontrollers

Toshiba offers a large variety of 4-bit microcontrollers with on-board functions including LCD, LED, VFD, PWM outputs, watchdog timers, SIO, A/D, D/A, dual clock, beep output, DTMF generator and standard timer/counters. These microcontrollers can be used in a wide range of applications, such as appliances, industrial controllers, telephones, televisions, VCRs, lighting equipment, meters and most other consumer applications. To make code development simple, Toshiba offers In-Circuit Emulators, piggybacks, EPROMs, and One Time Programmable Devices.

TLCS42 Series

Type	ROM (bit)	RAM (bit)	I/O Port (bit)	MIN. Instruction Execution Time (µS)	Supply Voltage (V)	Package	Piggyback Board	Function
TMP42C40P	512 x 8	32 x 4	11	1.0 (2.5)	4.5~5.5 (4.0~6.0)	DIP16	BM4211A	Standard
TMP42C60P	1024 x 8	32 x 4	11	1.0 (2.5)	4.5~5.5 (4.0~6.0)	DIP16	BM4211A	
TMP42C50N/M	512 x 8	32 x 4	23	1.0 (2.5)	4.5~5.5 (4.0~6.0)	SDIP/SOP28	BM4211A	
TMP42C70N/M	1024 x 8	32 x 4	23	1.0 (2.5)	4.5~5.5 (4.0~6.0)	SDIP/SOP28	BM4211A	
TMP42C66P	1024 x 8	32 x 4	15	1.0 (2.5)	4.5~5.5 (4.0~6.0)	DIP20	BM4212	Pulse (remote-controlled) output circuit AC zero-crossing detection circuit
TMP42C00Y	External (1024 x 8)	32 x 4	23	1.0 (2.5)	4.5~5.5 (4.0~6.0)	PGA64	—	Evaluator Chip

TLCS47E Series

Type	ROM (byte)	RAM (nibble)	I/O Port	MIN. Instruction Execution Time (µS)	Line Voltage (V)	Package	Piggyback (conversion adapter)	OTP Version (EPROM writer connection adapter)	Function
TMP47C101P/M	1K	64	11	1.3	2.2~5.5	DIP16 SOP16	TMP47C990E (BM1160)	TMP47P201VP	LED Driver
TMP47C201P/M	2K	128	11	1.3	2.2~5.5	DIP16 SOP16	TMP47C990E (BM1160)	TMP47P201VP	
TMP47C102P/M	1K	64	15	1.3	2.2~5.5	DIP20 SOP20	—	(planned)	
TMP47C202P/M	2K	128	15	1.3	2.2~5.5	DIP20 SOP20	—	(planned)	
TMP47C103N/M	1K	64	23	1.3	2.2~5.5	SDIP28 SOP28	—	TMP47P403VN/M (BM1140/BM1141)	8-bit SIO LED Driver
TMP47C203N/M	2K	128	23	1.3	2.2~5.5	SDIP28 SOP28	—	TMP47P403VN/M (BM1140/BM1141)	
TMP47C241N/M	2K	128	21	1.3	2.7~6.0	SDIP28 SOP28	TMP47C940AE (BM1152)	TMP47P241VN/M (BM1156/BM1157)	A/D Converter LED Driver

TOSHIBA AMERICA ELECTRONIC COMPONENTS, INC.

TLCS47 Series (CMOS)

Type	ROM (byte)	RAM (nibble)	I/O Port	MIN. Instruction Execution Time (μS)	Line Voltage (V)	Package	Piggyback (conversion adapter)	OTP Version (EPROM writer connection adapter)	Function
TMP47C200BN/F	2K	128	36	1.9	2.7-6.0	SDIP42 QFP44	TMP47C990E/G	TMP47P400AN/F (BM1118/BM1125)	Standard (LED driver)
TMP47C400BN/F	4K	256	36	1.9	2.7-6.0	SDIP42 QFP44	TMP47C990E/G	TMP47P400AN/F (BM1118/BM1125)	
TMP47C460AN/F	4K	256	58	1.9	4.5-6.0	SDIP64 QFP67	TMP47C960AE	—	
TMP47C210AN/F	2K	128	36	1.9	4.5-6.0	SDIP42 QFP44	TMP47C991E/G	TMP47P410AN/F (BM1118/BM1125)	VFT driver
TMP47C410AN/F	4K	256	36	1.9	4.5-6.0	SDIP42 QFP44	TMP47C991E/G	TMP47P403VN/M (BM1140/BM1141)	
TTMP47C212AN	2K	128	35	1.9	4.5-6.0	SDIP42	TMP47C991E/G	—	
TMP47C412AN	4K	256	35	1.9	4.5-6.0	SDIP42	TMP47C991E/G	—	
TMP47C475AN	4K	256	55	1.9 (244)	4.5-6.0	SDIP64	TMP47C975AE	—	VFT driver D/A conversion (PWM) output Watchdog timer
TMP47C221AF	2K	192	28	1.9	4.5-6.0	QFP64	TMP47C921AG	TMP47P421AF (BM1114)	LCD driver
TMP47C421AF	4K	256	28	1.9	4.5-6.0	QFP64	TMP47C921AG	TMP47P421AF (BM1114)	
TMP47C423AF	4K	256	28	1.9	4.5-6.0	QFP64	—	—	LCD driver High-speed event counter
TMP47C425AF	4K	256	27	1.9 (244)	4.5-6.0	QFP67	TMP47C925AG	—	LCD driver
TMP47C231AN	2K	128	24	1.9	4.5-6.0	SDIP30	TMP47C931AE (BM1103)	—	D/A conversion (PWM) output LED driver 4-bit A/D conversion input Remote control judgement circuit
TMP47C233AN	2K	128	36	1.9	4.5-6.0	SDIP42	TMP47C933AE	—	D/A conversion (PWM) output LED driver 3-bit A/D conversion input
TMP47C433AN	4K	256	36	1.9	4.5-6.0	SDIP42	TMP47C933AE	—	
TMP47C236AN	2K	128	20	1.9	4.5-6.0	SDIP30	—	—	D/A conversion (PWM) output LED driver 3-bit A/D conversion input On-screen display
TMP47C336AN	3K	192	20	1.9	4.5-6.0	SDIP30	—	—	
TMP47C237AN	2K	128	24	1.9	4.5-6.0	SDIP30	—	—	D/A conversion (PWM) output LED driver 3-bit A/D conversion input Bar display OSD
TMP47C337AN	3K	192	24	1.9	4.5-6.0	SDIP30	TMP47C937AE (BM1103)	—	
TMP47C242BN	2K	128	23	1.9	2.7-6.0	SDIP30	TMP47C940AE (BM1113)	TMP47P242VN (BM1124)	A/D converter Watchdog timer LED driver
TMP47C440AN/F	4K	256	34	1.9	4.5-6.0	SDIP42 QFP44	TMP47C940AE/G	TMP47P440AN/F (BM1118/BM1125)	
TMP47C441AN/F	4K	256	34	1.9	4.5-6.0	SDIP42 QFP44	TMP47C941AE/G	TMP47P441AN/F (BM1118/BM1125)	A/D converter Watchdog timer VFT driver
TMP47C446AF	4K	256	24	1.9 (244)	4.5-6.0	QFP64	TMP47C946AG	TMP47P446VF (BM1127)	A/D converter Watchdog timer LCD driver
TMP47C451BN	4K	768	23	16.7	2.2-6,0	SDIP30	TMP47C952AE (BM1104)	TMP47P451VN (BM1119)	DTMF generator
TMP47C452BN/F	4K	768	35	16.7	2.2-6.0	SDIP42 QFP44	TMP47C952AE/G	TMP47P452VN/F (BM1120/BM1121)	
TMP47C453AN/F	4K	768	35	8.3	2.2-6.0	SDIP42 QFP44	TMP47C953AE/G	TMP47P453VN/F (BM1120/BM1121)	
TMP47C454AN	4K	768	23	2.1	2.7-6.0	SDIP30	—	TMP47P454VN (BM1119)	
TMP47C407AN/F	4K	768	35	2.1	2.7-6.0	SDIP42 QFP44	—	TMP47P407VN/F (BM1120/BM1121)	
TMP47C456AF	4K	768	35	8.3 (244)	2.7-6.0	QFP80	TMP47C956AG	—	DTMF generator LCD driver

Note: (244) – indicates slow mode

TOSHIBA AMERICA ELECTRONIC COMPONENTS, INC.

TLCS470 Series

Type	ROM (byte)	RAM (nibble)	I/O Port	MIN. Instruction Execution Time (µS)	Line Voltage (V)	Package	Piggyback (conversion adapter)	OTP Version (EPROM writer connection adapter)	Function
TMP47C800N/F	8K	512	36	1.3 (244)	4.5~6.0	SDIP42 QFP44	TMP47C980E	TMP47P800N/F (BM1108/BM1111)	Standard (LED driver)
TMP47C620F	6K	384	36	1.3 (244)	4.5~6.0	QFP80	TMP47C020G	TMP47P820VF (BM1112)	LCD driver (32 x 4) High-speed timer/counter
TMP47C820F	8K	512	36	1.3 (244)	4.5~6.0	QFP80	TMP47C020G	TMP47P820VF (BM1112)	
TMP47C434N/F	4K	265	28	1.9	4.5~6.0	SDIP42 QFP44	TMP47C034E (BM1105)	—	On-screen display circuit D/A conversion (PWM) output 3-bit A/D conversion input Remote control signal preprocessing
TMP47C634N/F	6K	384	28	1.9	4.5~6.0	SDIP42 QFP44	TMP47C034E (BM1105)	—	
TMP47C635N	6K	384	41	1.9	4.5~6.0	SDIP54	TMP47C034E (BM1106)	—	
TMP47C834N/F	8K	512	28	1.9	4.5~6.0	SDIP42 QFP44	—	TMP47P834N (BM1117)	
TMP47C647F	6K	384	35	1.3 (244)	4.5~6.0	QFP80	—	TMP47P847VF (BM1135)	A/D converter (8-bit x 8-ch) LCD driver (32 x 4)
TMP47C847F	8K	512	35	1.3 (244)	4.5~6.0	QFP80	—	TMP47P847VF (BM1135)	
TMP47C850N/F	8K	512	52	2.23 (244)	4.5~5.5	SDIP64 QFP64	TMP47C050E TMP47C050G	*TMP47P850VN/F (BM1161/BM1165)	DTMF receiver 4-bit A/D conversion input
TMP47C655F	6K	896	36	8.3 (244)	2.2~6.0	QFP80	TMP47C055G	TMP47P855VF (BM1123)	LCD driver (32 x 4) DTMF generator
TMP47C855F	8K	1024	36	8.3 (244)	2.2~6.0	QFP80	TMP47C055G	TMP47P855VF (BM1123)	
TMP47C858F	8K	512	36	8.3 (244)	2.7~6.0	QFP100	TMP47C058G	—	LCD driver (44 x 10) DTMF generator
TMP47C660N/F	6K	384	56	1.3 (244)	4.5~6.0	SDIP64 QFP64	TMP47C060E	TMP47P860N/F (BM1102/BM1109)	A/D converter (8-bit x 8-ch) Remote control signal preprocessing LED driver
TMP47C860N/F	8K	512	56	1.3 (244)	4.5~6.0	SDIP64 QFP64	TMP47C060E	TMP47P860N/F (BM1102/BM1109)	
TMP47C662AN	6K	384	55	1.3 (244)	4.5~6.0	SDIP64	—	TMP47P862VN (BM1128)	A/D converter (8-bit x 8-ch) Remote control signal preprocessing LED driver Pulse Generator VFT driver (16 x 11)
TMP47C862AN	8K	512	55	1.3 (244)	4.5~6.0	SDIP64	—	TMP47P862VN (BM1128)	
TMP47C670N	6K	384	53	1.3 (244)	4.5~6.0	SDIP64	TMP47C070E	TMP47P870N (BM1107)	VFT driver (automatic) D/A conversion (PWM) output 4-bit A/D conversion input Remote control signal preprocessing
TMP47C870N	8K	512	53	1.3 (244)	4.5~6.0	SDIP64	TMP47C070E	TMP47P870N (BM1107)	

TLCS470A Series

Type	ROM (byte)	RAM (nibble)	I/O Port	MIN. Instruction Execution Time (µS)	Line Voltage (V)	Package	Piggyback (conversion adapter)	OTP Version (EPROM writer connection adapter)	Function
TMP47C1220F	12K	768	36	1.3 (244)	4.5~6.0	QFP80	—	TMP47P1620VF (BM1162)	LCD driver (32 x 4) High-speed timer/counter
TMP47C1620F	16K	768	36	1.3 (244)	4.5~6.0	QFP80	—	TMP47P1620VF (BM1162)	
TMP47C1237N	12K	512	32	1.3 (244)	4.5~6.0	SDIP42	TMP47C038E (BM1105)	TMP47P1637VN (*BM1168)	On-screen display circuit D/A conversion (PWM) output 4-bit A/D conversion input Remote control signal preprocessing
TMP47C1637N	16K	512	32	1.3 (244)	4.5~6.0	SDIP42	TMP47C038E (BM1105)	TMP47P1637VN (*BM1168)	
TMP47C1238AN	12K	512	41	1.3 (244)	4.5~6.0	SDIP54	TMP47C038E (BM1106)	*TMP47P1638VN (*BM1169)	
TMP47C1638AN	16K	512	41	1.3 (244)	4.5~6.0	SDIP54	TMP47C038E (BM1106)	*TMP47P1638VN (*BM1169)	
TMP47C853N/F	8K	1024	35	8.3 (244)	2.2~6.0	SDIP42 QFP44	—	TMP47P853VN/F (BM1120/BM1121)	DTMF generator
TMP47C457N/F	4K	768	35	2.1 (244)	2.7~6.0	SDIP42 QFP44	—	TMP47P857VN/F (BM1120/BM1121)	
TMP47C857N/F	8K	1024	35	2.1 (244)	2.7~6.0	SDIP42 QFP44	—	TMP47P857VN/F (BM1120/BM1121)	
TMP47C1260N/F	12K	768	56	1.3 (244)	4.5~6.0	SDIP64 QFP64	TMP47C006E	TMP47P1660VN/F (BM1130/BM1132)	A/D converter (8-bit x 8-ch) Remote control signal preprocessing LED driver
TMP47C1660N/F	16K	768	56	1.3 (244)	4.5~6.0	SDIP64 QFP64	TMP47C006E	TMP47P1660VN/F (BM1130/BM1132)	
TMP47C1270AN	12K	768	53	1.3 (244)	4.5~6.0	SDIP64	TMP47C007E	TMP47P1670VN (BM1133)	VFT driver (16 x 2-12 x 16) D/A conversion (PWM) output 4-bit A/D conversion input Remote control signal preprocessing
TMP47C1670AN	16K	768	53	1.3 (244)	4.5~6.0	SDIP64	TMP47C007E	TMP47P1670VN (BM1133)	

Note: (244) – indicates slow mode

* Under development, ( ) Min. execution time during low frequency clock operation. Type suffix: P: Plastic Standard Dual In-Line Package (DIP), N: Plastic Shrink Dual In-Line Package (SDIP), M: Plastic Small Outline Package (SOP), F: Plastic Flat Package (QFP), G: Ceramic Flat Package (QFC), E: Ceramic Shrink Dual In-Line Package (SDIC)

TOSHIBA AMERICA ELECTRONIC COMPONENTS, INC.

8-Bit Microcontrollers

TLCS870 Series (CMOS)

Features

Basic Functions

- Original architecture
- Max. 64KB address space
- Minimum instruction execution time:
  0.5μs (at 8MHz/4.5V)
  122μs (at 32.8KHz/2.7V)
- Basic instructions: 129 types, 412 instructions
  Multiplication (8-bit ÷ 8-bit)
  Division (16-bit x 8-bit)
  Variety of bit manipulations
  16-bit data operation
  1-byte length jump/call
- Max. 15 interrupt sources
  High-speed task switching by register bank switching
  External interrupt input with edge selection and noise rejection function
- Dual-clock system to switch between high-speed operation and low power operation
- General purpose register banks
- Eight 8-bit registers x 16 banks
- Various standby modes

Additional Functions

- Multifunction timer/counter
  16-bit timer/counter: 1-2ch
  8-bit timer/counter: 2-4ch
  Time-base timer: 1ch
  Watchdog timer: 1ch
- Divider output function (for piezoelectric buzzer device), PWM, PPG, event counter
- 8-bit serial interface: 1-2ch
  Built-in 64-bit transmit/receive data buffer
- VFT driver
- LCD driver
- LED driver
- 8-bit A/D converter
- I²C bus interface

TLCS870 Series

Type	ROM (byte)	RAM (byte)	I/O Port	MIN. Instruction Execution Time (μS)	Line Voltage (V)	Operating Temperature (°C)	OTP Version (EPROM writer connection adapter)	Package	Function
TMP87C800N/F	8K	256	58	0.50/122 0.95/122	4.5~6 2.7~6	-30~70	TMP87PH00N/F (BM1136/BM1137)	SDIP64 QFP64	LED driver Timer/counter x 4ch Serial interface x 2ch Watchdog timer Time-base timer
TMP87CH00N/F	16K	256	58	0.50/122 0.95/122	4.5~6 2.7~6	-30~70	TMP87PH00N/F (BM1136/BM1137)	SDIP64 QFP64	
TMP87CH00LF	16K	256	58	0.95/122	1.8~5.5	-30~70	—	SDIP64 QFP64	
TMP87CC20F	12K	512	45	0.50/122 0.95/122	4.6~6 2.7~6	-30~70	TMP87PH20F (BM1138)	QFP80	LCD driver (32 ~ 24 segments x 4 commons) Timer/counter x 5ch Serial interface x 1ch Watchdog timer Time-base timer
TMP87CH20F	16K	512	45	0.50/122 0.95/122	4.6~6 2.7~6	-30~70	TMP87PH20F (BM1138)	QFP80	
*TMP87C832N	8K	256	34	0.50/122	4.5~6	-30~70	—	SDIP42	On-screen display circuit (closed caption support)
TMP87C840N/F	8K	256	56	0.50/122 0.95/122	4.6~6 2.7~6	-30~70	TMP87PH40N/F **TMP87PK40KF (BM1136/BM1137)	SDIP64 QFP64	LED driver 8-bit A/D converter x 8ch Timer/counter x 4ch Serial interface x 2ch Watchdog timer Time-base timer
TMP87CC40N/F	12K	512	56	0.50/122 0.95/122	4.6~6 2.7~6	-30~70	TMP87PH40N/F **TMP87PK40KF (BM1136/BM1137)	SDIP64 QFP64	
TMP87CH40N/F	16K	512	56	0.50/122 0.95/122	4.6~6 2.7~6	-30~70	TMP87PH40N/F **TMP87PK40KF (BM1136/BM1137)	SDIP64 QFP64	
TMP87CK40N/F	24K	1K	56	0.50/122 0.95/122	4.6~6 2.7~6	-30~70	TMP87PM40N (BM1136)	SDIP64	
TMP87CH40KF	24K	1K	56	0.50/122 0.95/122	4.6~6 2.7~6	-30~70	TMP87PM40N (BM1136)	SDIP64	
*TMP87CM40AN/F	32K	1K	56	0.50/122 0.95/122	4.6~6 2.7~6	-30~70	TMP87PM40N (BM1136)	SDIP64	
TMP87CK42N	24K	512	35	0.50/122 0.95/122	4.6~6 2.7~6	-30~70	*TMP87PK42N (BM1163)	SDIP42	8-bit A/D converter x 6ch Serial bus interface
TMP87CC70F	12K	512	73	0.50/122	4.5~6.0	-30~70	TMP87PM70F (BM1150)	QFP80	VFT driver (16seg x 16dig) 6-bit A/D conversion input x 6ch Timer/counter x 4ch Serial interface Watchdog timer Time-base timer
TMP87CH70F	16K	512	73	0.50/122	4.5~6.0	-30~70	TMP87PM70F (BM1150)	QFP80	
TMP87CK70AF	24K	512	73	0.50/122 0.95/122	4.5~6 2.7~6	-30~70	TMP87PM70F (BM1150)	QFP80	
TMP87CM70AF	32K	512	73	0.50/122 0.95/122	4.5~6 2.7~6	-30~70	TMP87PM70F (BM1150)	QFP80	

NOTE: * Under development, **Only for sample
Type suffix: N: Plastic Shrink Dual In-Line Package (SDIP), F: Plastic Flat Package (QFP)

TOSHIBA AMERICA ELECTRONIC COMPONENTS, INC.

8-Bit Microcontrollers

TLCS90 Series

Features

Memory Capacity

- ➤ Wide selection from ROM-less versions to 32KB versions
- ➤ Wide selection from RAM-less versions to 1KB versions
- ➤ Externally expandable memory and I/O; Program memory: Max. 8MB
- ➤ Data memory: Max. 8MB

Basic Processor Functions

- ➤ Original architecture
- ➤ Minimum instruction execution time: 250ns (at 16MHz)
- ➤ 167 instruction types, multiplication/division instructions, 16-bit arithmetic instruction, bit manipulation instruction
- ➤ Internal interrupt, external interrupt, micro DMA function, standby function

Additional Functions

- ➤ 8-bit A/D converter ➤ General purpose serial interface
- ➤ Multifunction 16-bit timer/event counter (PPG output mode, frequency measurement, pulse width measurement, time difference measurement)
- ➤ 8-bit timer (PWM output mode, PPG output mode)
- ➤ Stepper motor control ➤ Watchdog timer
- ➤ MMU (data memory: 8MB)
- ➤ Slave bus function
- ➤ 8-bit half flash A/D converter
- ➤ 8-bit D/A converter
- ➤ Built-in RTC (Real Time Clock)
- ➤ DRAM controller

Type	Built-in ROM (byte)	Built-in RAM (byte)	I/O Port	MIN. Instr. Execution Time (ns)	Operating Temp. (°C)	Package	OTP Version (EPROM writer connection adapter)	Function
TMP90C840AN/AF	8K	256	54	320	–20 ~ 70	SDIP64 QFP64	TMP91P640E-10/N-10 (BM1115A) TMP91P640F-10 (BM1116A)	A/D converter: 8-bit x 6ch Timer/counter: 16-bit x 1 ch (capture/PPG) Timer: 8-bit x 4ch (PWM/PPG) Serial: 1ch (UART. I/O Expansion) Stepping motor control port Watchdog timer Micro DMA function Program memory: 64KB Data memory: 1 MB
TMP90C841AN/AF	–	256	28	320	–20 ~ 70	SDIP64 QFP64	TMP91P640E-10/N-10 (BM1115A) TMP91P640F-10 (BM1116A)	
TMP91C640N/F	16K	512	54	320	–20 ~ 70	SDIP64 QFP64	TMP91P640E-10/N-10 (BM1115A) TMP91P640F-10 (BM1116A)	
TMP91C641N/F	–	512	28	320	–20 ~ 70	SDIP64 QFP64	TMP91P640E-10/N-10 (BM1115A) TMP91P640F-10 (BM1116A)	
TMP90CM40N/F	32K	1K	54	320	–20 ~ 70	SDIP64 QFP64	TMP90PM40N/F (BM1115A/BM1116A)	
TMP90C041N/F-15 TMP90C041N/F	–	–	28	267	0 ~ 60	SDIP64 QFP64	–	
TMP90C141N/F	–	1K	28	320	–20 ~ 70	SDIP64 QFP64	–	
TMP90C802P/M	8K	128	32	320	–20 ~ 70	DIP40 SOP40	TMP90P802AP/AM (BM1158/BM1159)	Timer/counter: 8-bit x 4ch Serial: 1ch Program/data memory: 64KB
TMP90C802AP/AM	8K	512	32	320	–20 ~ 70	DIP40 SOP40	TMP90P802AP/AM (BM1158/BM1159)	
TMP90CH02M/P	16K	512	32	320	–20 ~ 70	DIP40 SOP40	TMP90PH02M/P (BM1159/BM1158)	
TMP90C803AP/AM	–	256	6	320	–20 ~ 70	DIP40 SOP40	TMP90P802AP/AM (BM1158/BM1159)	
TMP90CH03M/P	–	512	6	320	–20 ~ 70	DIP40 SOP40	–	
TMP90C400N/F	4K	128	56	320	–20 ~ 70	SDIP64 QFP64	TMP90P800N/F (BM1142/BM1147)	Timer/counter: 8-bit x 4ch Serial: 1ch 22 programmable pull-up port Program/data memory: 64KB
TMP90C401N/F	–	128	38	320	–20 ~ 70	SDIP64 QFP64	TMP90P800N/F (BM1142/BM1147)	
TMP90C800N/F	8K	256	56	320	–20 ~ 70	SDIP64 QFP64	TMP90P800N/F (BM1142/BM1147)	
TMP90C801N/F	–	256	38	320	–20 ~ 70	SDIP64 QFP64	TMP90P800N/F (BM1142/BM1147)	
TMP90C844N/F	8K	256	54	250	–20 ~ 70	SDIP64 QFP64	TMP90PH44N/F (BM1148/BM1149)	Slave bus function 90C840A with upgraded I/O function
TMP90CH44N/F	16K	512	54	250	–20 ~ 70	SDIP64 QFP64	TMP90PH44N/F (BM1148/BM1149)	
TMP90C845N/F	–	256	38	250	–20 ~ 70	SDIP64 QFP64	–	Version with expanded external memory 90C840A with upgraded I/O function Program memory: 4MB; Data memory: 8MB
TMP90CH45N/F	–	512	38	250	–20 ~ 70	SDIP64 QFP64	–	
TMP91C642N/F	16K	320	54	400	–20 ~ 70	SDIP64 QFP64	TMP91P642N/F (BM1144/BM1145)	VCR servo Built-in VCR dedicated circuit
TMP90CH42DF/F	16K	640	72	320	–20 ~ 70	100QFP	TMP90M42DF/F (BM1151/1154)	
TMP90CK42F	24K	640	72	320	–20 ~ 70	QFP100	TMP90PM42F (BM1154)	
TMP90C846F	8K	256	28	400	–20 ~ 70	MFP44	TMP90P846F (BM1143)	Flash A/D converter: 8-bit x 2ch D/A converter: 8-bit x 2ch Timer (8-bit x 4ch. 16-bit x 1ch)
TMP90C051F	–	–	31	250	–20 ~ 70	QFP80	–	Built-in high-speed micro DMA, RTC, MMU, DRAM controller. TPH controller
TMP90C848F	8K	512	62	400	–20 ~ 70	QFP80	TMP90PH48F (BM1153)	8-bit PWM: 8ch; Flash A/D converter: 8-bit x 16ch; Dual clock system
TMP90CM36F/T TMP90CM37F/T	32K –	1K	64	250	–20 ~ 70	80MFP 84PLCC	TMP90PM3LF/T (BM1181/1182)	8-bit: 8ch ADC; 8-bit: 2ch DAC Serial: 3ch; Programmable Timing Pulse Generator; Program/data memory: 64KB
TMP90CM38F/T	32	1K	66	250	–20 ~ 70	80MFP 84PLCC	TMP90CM39F/T (BM1181/1182)	8-bit: 8ch ADC; Serial: 3ch Stepping Motor Control Port Programmable/data memory: 64KB

NOTE: *Under development. OC: Output compare. IC: Input capture; Type suffix: P: Plastic Standard Dual In-line Package (DIP), N: Plastic Shrink Dual In-line Package (SDIP), M: Plastic Small Outline Package (SOP). F: Plastic Flat Package (QFP). E: Ceramic Shrunk Dual In-line Package (SDIC);

Note 1: A minimum instruction execution time of 320ns is guaranteed for an operating temperature between –20°C and 70°C and 400ns for an operating temperature between –40°C and 85°C.

TOSHIBA AMERICA ELECTRONIC COMPONENTS, INC.

8-Bit Microcontrollers

TMP68HC05/11 Series (CMOS)

Features

Memory Capacity

- TMP68HC05: Built-in 4KB
  Built-in 176-byte RAM

  TMP68HC11: Selectable from no ROM to 16KB ROM
  Built-in RAM: max. 512 bytes
  Built-in EEPROM: max. 512 bytes

Basic Processor Functions

- Pin and software compatible with Motorola M68HC05 and M68HC11 families
- Minimum instruction execution time:
  0.96μs (at 2.1MHz)
  0.67μs (at 3.0MHz)

TMP68HC05/11 Series

Type	ROM (byte)	EEPROM (byte)	RAM (byte)	I/O Port	MIN. Instruction Execution Time (μS)	Line Voltage (V)	Operating Temperature (°C)	Package	Function
TMP68HC05C4P	4160	—	176	31	0.96	3.0~5.5	0~70	DIP40 DIC40	Free-run counter: 16-bit x 1ch OC: 1ch, IC: 1ch Serial: 2ch (synchronous, asynchronous)
TMP68HC11A8P/N/T/F*	8K	512	256	38	0.96	4.5~5.5	–40~85	DIP48 SDIP64 PLCC52 *QFP64	A/D converter: 8-bit, 8ch Pulse accumulator: 8-bit x 1ch Free-run counter: 16-bit x 1ch OC: 5ch, IC: 3ch Serial: 2ch (synchronous, asynchronous) Watchdog timer Clock monitor reset Illegal operation code trap
TMP68HC11A1P/N/T/F*	—	512	256	22	0.96	4.5~5.5	–40~85	DIP48 SDIP64 PLCC52 *QFP64	
TMP68HC11A0P/N/T/F*	—	—	256	22	0.96	4.5~5.5	–40~85	DIP48 SDIP64 PLCC52 *QFP64	
TMP68HC11A1T-3 *TMP68HC11A1F-3	—	512	256	22	0.67	4.5~5.5	0~70	PLCC52 QFP64	
TMP68HC11A0T-3 *TMP68HC11A0F-3	—	—	256	22	0.67	4.5~5.5	0~70	PLCC52 QFP64	
TMP68HP11A1T-A TMP68HP11A1P-A	—	512	256	22	0.96	4.5~5.5	–40~85	PLCC52 DIP48	Watchdog timer enabled product
TMP68HC11E9N/T/F*	12K	512	512	38	0.96	4.5-5.5	–40~85	SDIP64 PLCC52 *QFP64	A/D converter: 8-bit • 8ch Pulse accumulator: 8-bit x 1ch Free-run counter: 16-bit x 1ch OC: 5ch, IC: 4ch Serial: 2ch (synchronous, asynchronous) Watchdog timer Clock monitor reset Illegal operation code trap
TMP68HC11E1N/T/F*	—	512	512	22	0.96	4.5~5.5	–40~85	SDIP64 PLCC52 *QFP64	
TMP68HC11E0N/T/F*	—	—	512	22	0.96	4.5~5.5	–40~85	SDIP64 PLCC52 *QFP64	
TMP68HC11E1T-3 *TMP68HC11E1F-3	—	512	512	22	0.67	4.5-5.5	0~70	PLCC52 *QFP64	
TMP68HC11E0T-3 *TMP68HC11E0F-3	—	—	512	22	0.67	4.5~5.5	0~70	PLCC52 *QFP64	
TMP68HP11E1T-A	—	512	512	22	0.96	4.5~5.5	0~70	PLCC52	Watchdog timer enabled product
TMP68HC11J6N/T/F*	16K	—	512	54	0.63	4.5~5.5	–40~85	SDIP64 SDIC64 PLCC68	I/O and ROM enhanced version of 68HC11E9
TMP68C711J6N/E/T/F*	(16K)	—	512	54	0.63	4.5~5.5	–40~85	SDIP64 SDIC64 PLCC68	

NOTE: * Under development, ( ) EPROM or OTPROM size, OC: Output compare, IC: Input capture Type suffix: P: Plastic Standard Dual In-Line Package (DIP), N: Plastic Shrink Dual In-Line Package (SDIP), F: Plastic Flat Package (QFP), T: Plastic Leaded Chip Carrier (PLCC), E: Ceramic Shrink Dual In-Line Package (SDIC)

TOSHIBA AMERICA ELECTRONIC COMPONENTS, INC.

8-Bit Microprocessors
TLCSZ80 Series (CMOS) & Z80-Based ASSP (CMOS)

TLCSZ80 Series

Features

- Software and hardware compatible with Zilog's Z80 family
- Low power dissipation (approx. 1/10 of NMOS)
- Static operation/HOLD function
- Plastic DIP, plastic leaded chip carrier (PLCC), and plastic small-outline package (SOP) available

TLCSZ80 Series (Supply Voltage: 4.5 ~ 5.5V, Operating Temp.: –40 ~ 85°C, Clock Rate: DC ~8MHz)

Part Number			Instruction Cycle Time (µS)	Supply Current Max. (mA)	No. of Pins	Compatible Component	Function
6MHz	8MHz	10MHz					
TMPZ84C00AP-6	TMPZ84C00AP-8	TMPZ84C00AP-10	0.6/0.5/0.4	15/20	40	Z80A/B/H CPU	Microprocessor (6/8/10MHz)
TMPZ84C10AP-6	—	—	—	6	40	Z80A/B/H DMA	Direct memory access controller (6/8MHz)
TMPZ84C20AP-6	TMPZ84C20AP-8	—	—	3/4	40	Z80A/B/HP10	Parallel I/O controller (6/8MHz)
TMPZ84C30AP-6	TMPZ84C30AP-8	—	—	4/5	28	Z80A/B/H CTC	Counter timer circuit (6/8MHz)
TMPZ84C40AP-6	TMPZ84C40AP-8	—	—	4/5	40	Z80A/B/H SI0/0	Serial I/O controller (6/8MHz)
TMPZ84C41AP-6	TMPZ84C41AP-8	—	—	4/5	40	Z80A/B/H SI0/1	Serial I/O controller (6/8MHz)
TMPZ84C42AP-6	TMPZ84C42AP-8	—	—	4/5	40	Z80A/B/H SI0/2	Serial I/O controller (6/8MHz)
TMPZ84C61AP-6	—	—	—	4	16	Z80 CGC	Clock generator/controller (6MHz)
TMPZ84C00AT-6	TMPZ84C00AT-8	TMPZ84C00AT-10	0.6/0.5/0.4	15/20	44	Z80A/B/H CPU	Microprocessor (6/8/10MHz)
TMPZ84C10AT-6	—	—	—	6	44	Z80A/B/H DMA	Direct Memory Access Controller (6/8MHz)
TMPZ84C20AT-6	TMPZ84C20AT-8	—	—	3/4	44	Z80A/B/H P10	Parallel I/O controller (6/8MHz)
TMPZ84C30AT-6	TMPZ84C30AT-8	—	—	4/5	44	Z80A/B/H CTC	Counter timer circuit (6/8MHz)
TMPZ84C44AT-6	TMPZ84C44AT-8	—	—	4/5	44	Z80A/B/H SI0/0	Serial I/O controller (6/8MHz)

Z80-Based ASSP (Application Specific Standard Products)

Features

- Integration of diverse peripheral functions with the Z80 CPU as the core
- Wide selection of processors covering an extensive range of applications

Note: Z80 is a trademark of Zilog in the U.S.A.

Z80 ASSP

Type	Package			MIN. Instruction Execution Time (µS)	Standard Line Current (mA)	Function
	DIP No. of pins	QFP No. of pins	PLCC No. of pins			
TMPZ84C011BF-6/BF-8	—	100	—	0.6/0.5	22/31	CPU+CGC+CTC+I/O (8 x 5)
TMPZ84C013AT-6/AT-8/AT-10	—	—	84	0.6/0.5/0.4	22/31/40	CPU+SIO+CTC+CGC+Watchdog Timer
TMPZ84C015BF-6/BF-8/BF-10/BF-12*	—	100	—	0.6/0.5/0.4/0.3	25/35/45/55	CPU+SIO+CTC+PIO+CGC+Watchdog Timer
TMPZ84C112BN-6/BF-6	64	64	—	0.6	15	CPU+256-byte RAM+I/O (8 x 2, 7 x 1) + free-run timer + clock generator
TMPZ84C810BF-6/BF-8/BF-10	—	100	—	0.6/0.5/0.4	25/35/45	CPU+SIO+CTC+DMA+I/O (8 x 1) + OUTPORT (5 x 1) + WDT + MMU x CGC

Operating Temperature: –40~85°C Line Voltage: 4.5~5.5V (–40~70°C guaranteed for 8/10MHz products)

NOTE: * Under development, Type suffix: P: Plastic Standard Dual In-Line Package (DIP), M: Plastic Small Outline Package (SOP), F: Plastic Flat Package (QFP), T: Plastic Leaded Chip Carrier (PLCC)

TOSHIBA AMERICA ELECTRONIC COMPONENTS, INC.

8-Bit Microprocessors

TLCS85 Series (CMOS) & TLCS48 Series (CMOS)

TLCS85 Series

Features:

- Industry standard 8-bit microprocessor and peripherals
- 80 instructions
- Min. 0.8µs instruction cycle time at 10MHz
- High-speed CMOS peripherals

TLCS85 Series

Part Number			Supply Current (mA)	No. of Pins	Function
5MHz	8MHz	10MHz			
TMP8085AP-2	—	—	170	40	8-bit microprocessor, .8µs instruction cycle time
TMP82C51AP-2	—	TMP82C51AP-10	1.2/3.0	28	Programmable communication interface
—	—	TMP82C54P-2	3.0	24	Programmable interval timer
TMP82C55AP-2	—	TMP82C55AP-10	2.0/2.0	40	Programmable peripheral interface
—	TMP82C59AP-2	—	1.0	28	Programmable interrupt controller
TMP82C79P-2	—	—	2.0	40	Programmable keyboard/display interface
TMP82C255AN-2	—	TMP82C255AN-10	3.0/3.0	64	Programmable peripheral interface
TMP82C265AF-2	—	TMP82C265AF-10	3.0/3.0	80	Programmable peripheral interface
TMP82C37AM-5	TMP82C37BM-8	—	5.0/16.0	40	Programmable DMA controller
TMP82C51AM-2	—	TMP82C51AM-10	1.2/3.0	28	Programmable communications interface
—	—	TMP82C54M-2	3.0	24	Programmable interval timer
TMP82C55AM-2	—	TMP82C55AM-10	2.0/2.0	40	Programmable peripheral interface
—	TMP82C59AM-2	—	1.0	28	Programmable interrupt controller

TLCS48 Series

Features:

Memory

- Max. 4KB ROM and 256 byte RAM

Processor

- Software and pin compatible with Intel's 8048 series
- 96/97 instructions, min. 2.5/1.36µS at 6/11MHz ocs.

Additional Functions

- 8-bit interval timer/event counter

TLCS48 Series

Part Number ROM (ROMLESS)	ROM (bit)	RAM (bit)	I/O Port (bit)	Instruction Cycle Time (µS)	Supply Voltage (V)	Supply Current Max. (mA)	Operating Temp. (°C)	Package
TMP80C48AP-6 (TMP80C35AP-6)	1024 x 8 4096 x 8 External	64 x 8	27 (19)	2.5	4.0-6.0	10 <0.01>	–40~85	40 Pin DIP
TMP80C48AP (TMP80C35AP)	1024 x 8 4096 x 8 External	64 x 8	27 (19)	1.36	4.5-5.5	15 <0.01>	0~70 40 to 85	
TMP80C48T (TMP80C35AT)	1024 x 8 4096 x 8 External	64 x 8	27 (19)	1.36	4.5-5.5	15 <0.01>	0~70 -40 to 85	44 Pin PLCC
TMP80C49AP-6 (TMP80C39AP-6)	2048 x 8 4096 x 8 External	128 x 8	27 (19)	2.5	4.0-6.0	10	–40~85	40 Pin DIP
TMP80C49AP (TMP80C39AP)	2048 x 8 4096 x 8 External	128 x 8	27 (19)	1.36	4.5-6.5	15 <0.01>	0~70 –40 to 85	40 Pin DIP
TMP80C49AT (TMP80C39AT)	2048 x 8 4096 x 8 External	128 x 8	27 (19)	1.36	4.5-6.5	15 <0.01>	0~70 –40 to 85	44 Pin PLCC
TMP80C50AP-6 (TMP80C40AP-6)	4096 x 8 4096 x 8 External	256 x 8	27 (19)	2.5	4.0-6.0	10 <0.01>	–40~85	40 Pin DIP
TMP80C50AP (TMP80C40AP)	4096 x 8 4096 x 8 External	256 x 8	27 (19)	1.36	4.5-5.5	15 <0.01>	0~70 –40 to 85	
TMP82C43P	I/O Expander				4.0-6.0	2	–40~85	24 Pin DIP

NOTE: < > Hold current
( ) With external ROM

TOSHIBA AMERICA ELECTRONIC COMPONENTS, INC.

16-Bit Microprocessors
TLCS900 Series (CMOS)

Features

Basic Processor Functions

- Original 16-bit architecture
  (Upward compatibility with TLCS90 instruction set)
- Minimum instruction execution time
  200ns (at 20MHz)
- Large linear address space
  Program: 64KB/16MB
  Data: 16MB
- General purpose register method
  (Accumulators)
- Register bank method
  Switchable with 1 instruction
- Powerful instruction sets
  8/16/32-bit transfer, arithmetic
  16 x 16 = 32-bit multiplication
  32 ÷ 16 = 16 . . . 16-bit division
  Bit transfer, arithmetic, search
  16-bit multiplication–addition arithmetic
  Optimized to support efficient C compiler
- Improved reliability
  System mode/normal mode
  Illegal instruction interrupt
- High-speed micro DMA
  4-channel, 16MB space
  1.6µs/word (at 20 MHz)

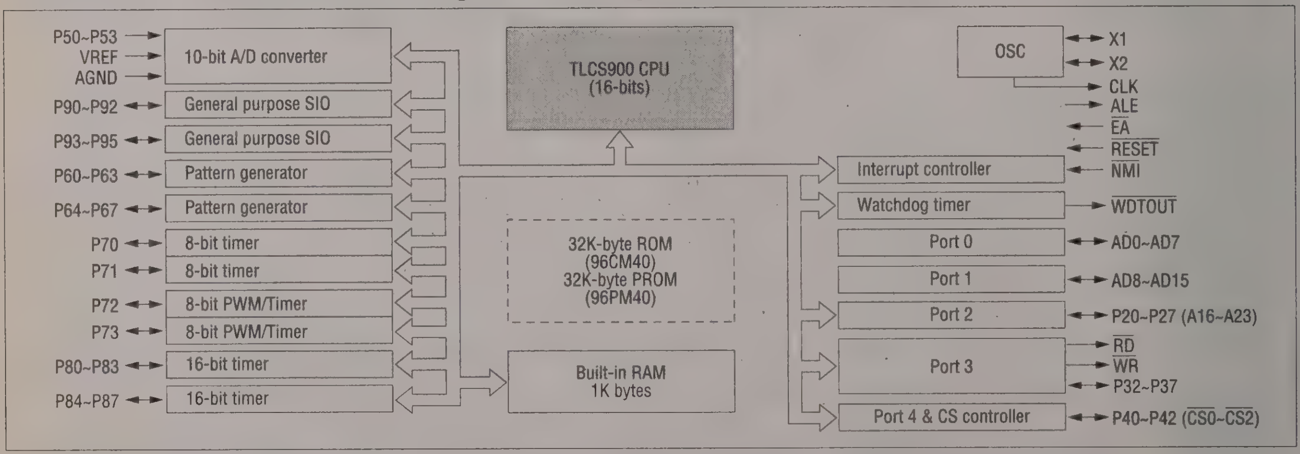
Additonal Functions

- CS/WAIT controller
  Mixture of external 8/16-bit buses
  WAIT width control
- 3 programmable chip selects
- Interrupt controller
  7-level priority method
- 8-bit timers
- 8-bit PWM timers
- Multifunction 16-bit timers
- Pattern generator (Stepper motor control)
- General purpose serial interface
- 10-bit A/D converter
- Watchdog timer
- Tri-state bus (for external DMA)

TLCS900 Series

Type	ROM (byte)	RAM (byte)	I/O Port	MIN. Instruction Execution Time (ns)	Operating Temperature (°C)	Package	One-time PROM product (EPROM writer connection adapter)	Function
TMP96C141F	—	1K	47	200	–20~70	QFP80	—	Timer/counter: 16-bit x 2ch Timer: 8-bit x 2ch PWM timer: 8-bit x 2ch Serial interface: 2ch Pattern generator: 4-bit x 2ch A/D converter: 10-bit x 4ch Watchdog timer CS/WAIT control
TMP96CM40F	32K	1K	65	200 (note 1)	–20~70	QFP80	TMP96PM40F (BM1139)	

TMP96C141/CM40/PM40 Configuration Diagram (80-pin QFP)


P50~P53
VREF
AGND
10-bit A/D converter
P90~P92
General purpose SIO
P93~P95
General purpose SIO
P60~P63
Pattern generator
P64~P67
Pattern generator
P70
8-bit timer
P71
8-bit timer
P72
8-bit PWM/Timer
P73
8-bit PWM/Timer
P80~P83
16-bit timer
P84~P87
16-bit timer
TLCS900 CPU
(16-bits)
32K-byte ROM
(96CM40)
32K-byte PROM
(96PM40)
Built-in RAM
1K bytes
OSC
X1
X2
CLK
ALE
EA
RESET
NMI
Interrupt controller
Watchdog timer
WDTOUT
Port 0
AD0~AD7
Port 1
AD8~AD15
Port 2
P20~P27 (A16~A23)
Port 3
RD
WR
P32~P37
Port 4 & CS controller
P40~P42 (CS0~CS2)

Note 1: A minimum instruction execution time of 200ns is guaranteed for an operating between –20°C and 70°C and 250ns for an operating temperature between –40°C and 85°C

TOSHIBA AMERICA ELECTRONIC COMPONENTS, INC.

16-Bit Microprocessors

TLCS68000 Series

Features

- Pin and software compatible with Motorola M68000 family
- 32-bit architecture general purpose microprocessors
- Powerful instruction sets
- Upward instruction compatibility
- Large linear address space (16MB/4GB)
- Flexible addressing mode
- Memory-mapped I/O
- Virtual memory/machine support
- Separates operation mode and address space
- Variety of data types:
  bit, digit, byte, word, long-word
- Variety of high-performance peripheral devices
- UNIX software support
- ASSP (Application Specific Standard Products) incorporating peripheral functions with CMOS 16-bit TMP68HC000 as the core

Note: M68000 is a trademark of Motorola Semiconductor in the U.S.A.
UNIX is a trademark of AT&T.

TLCS68000 Series

Type	Speed (MHz)	Package Type (No. of pins)						Equivalent Product	Function
		P	C	YC	Y	N	T		
TMP68000	8, 10, 12.5*	64	—	68	—	64	—	MC68000	16-bit MPU (internal 32-bits, external 16-bits)
TMP68HC000	10, 12.5*, 16.67	64	—	—	68	64	68	MC68HC000	CMOS 16-bit MPU
TMP68010	8, 10, 12.5	64	—	—	—	—	—	MC68010	16-bit virtual memory MPU
TMP68230	8, 10	48	—	—	—	—	—	MC68230	Parallel interface timer
TMP68440	8, 10	64	—	—	—	—	—	MC68440	Dual DMA controller
TMP68450	8, 10	—	64	—	—	—	—	MC68450	4-channel DMA controller
TMP68681	1 Mbit/s	40	—	—	—	—	—	MC68681	Dual universal asynchronous receiver transmitter
TMP68901	4	48	—	—	—	—	—	MC68401	Multifunction peripheral

NOTE: *12.5MHz is available with P and YC. Type suffix: P: Plastic DIP, C: Ceramic DIP, YC: PGA without standoff, Y: PGA with standoff,
N: Plastic Shrink DIP, T: Plastic PLCC

TOSHIBA AMERICA ELECTRONIC COMPONENTS, INC.

Application Specific Standard Products (ASSP)

68HC000-Based Integrated Microprocessors

TMP68301

Features

- 68HC000 core-based microprocessor
- 3 asynchronous serial ports with baud rate generator and optional modem control signals
- 16-bit parallel interface with optional Centronics interface mode
- 3 timer channels: 16-bits each with an 8-bit prescaler
- Built-in interrupt controller: 3 external and 7 internal sources with automatic interrupt vector generation
- Sophisticated address decoder: includes relocatable chip select generation for internal registers and external chip selects
- Automatic DTACK generation with 0 to 7 programmable wait states and programmable BERR generation

TMP68301

Device No.	Process	Speed	Package
TMP680301AF-12	CMOS	12MHz	QFP100
TMP68301AF-16	CMOS	16.67MHz	QFP100
TMP68301AFR-12	CMOS	12MHz	QFP100
TMP68301AFR-16	CMOS	16.67MHz	QFP100

TMP68303

Features

- 68HC000 core-based microprocessor
- 17 32-bit data and address registers
- 16MB direct addressing
- 56 powerful instruction types
- 14 addressing modes
- Memory mapped I/O
- Serial I/F: 2-channel (UART)
- Parallel I/F: 10-bit I/O
- Timer: 5-channel (including built-in watchdog timer)
- Interrupt controller: 12-channel (external: 3-channels, internal: 9-channels)
- Address decoder: external chip select signals ($\overline{CS0}$, $\overline{CS1}$)
- DMA controller: 3-channel
- DRAM controller: $\overline{RAS}$, $\overline{CAS}$, multiplexed address, A1~A11 for up to 8MB of DRAM
- Programmable wait state insertion
- Bus error detection
- Stepper motor controller: 2-channel, 4-phase
- Low power consumption (CMOS)

TMP68303

Device No.	Process	Speed	Package
TMP68303F-16	CMOS	16.67MHz	QFP100

TMP68305

Features

- 68HC000 core-based microprocessor
- Serial I/O: 2-channel (UART)
- 16-bit counter/timer with 8-bit prescaler
- Clock generator
- Interrupt controller: 9-channel (external: 4-channels, internal: 5-channels)
- Bus error detection
- Address decoder: 4 external chip select outputs
- DMA controller: 2-channel, 16MB direct memory access
- Block size: 128KB max.
- Transfer speed: 8MB/sec. max. (f=16MHz, single address)

TMP68305

Device No.	Process	Speed	Package
TMP68305F-16	CMOS	16.67MHz	QFP100

NOTE:
QFP: Quad flat package (square type)
RFP: Rectangle flat package (rectangular type)

Neuron Chip

TMPN3150, TMPN3120

Features

- ➤ Three 8-bit processors
  - ■ Two processors dedicated to LONTALK™ protocol processing
  - ■ A third processor dedicated to the node's specific application
- ➤ Eleven applications I/O pins, usable in many different combinations:
  - ■ 11 individually configurable digital inputs or outputs
  - ■ A parallel interface to an external microprocessor, with 8 data and 3 control lines
  - ■ 8 digital I/O pins, plus a 3-pin serial interface
- ➤ Two programmable, 16-bit counter/timers, one that can be multiplexed to 4 of the digital I/O pins
- ➤ A memory subsystem including:
  - ■ 2KB of RAM, for variables and buffers
  - ■ 512 bytes of EEPROM, for network parameters and application program storage
- ➤ A 48-bit Neuron ID unique to every device, irreversibly programmed into 6 of the EEPROM bytes
- ➤ A Service PIN for facilitating network installation
- ➤ A 5-pin LONTALK network interface that connects to either an external LONWORKS™ transceiver or, with external circuitry, to baseband media such as twisted pair
- ➤ Power-down, wake-up, watchdog timer, and other housekeeping circuitry

Neuron Chip

Part Number	CPUs	RAM	ROM	EEPROM	16-Bit Timer/ Counter	External Memory Interface	Package	Pins	Description
TMPN3150AF (BR,D)	3	2K	—	512 Bytes	2	Yes	QFP	64	Communication and control processors for distributed sense and control applications. All layers of the OSI Networking Model have been implemented in the included LONTALK™ Firmware-based protocol.
TMPN3120AM (D)	3	1K	10K	512 Bytes	2	No	SOIC	32	

The TMPN3150AF is programmed with the LONBUILDER™ Developer's Workbench which provides sophisticated platform development and system integration over twisted pair, powerline, RF and other networking media. Part number is BMN20000. Copyrights: Neuron, 3150, 3120, LONTALK, LONBUILDER/Echelon Corporation

CMOS Microcomputer Peripheral LSI

Microprocessor Peripherals

Features

- ➤ Total CMOS solution for low power consumption and heat dissipation
- ➤ Many devices compatible with accepted industry standards
- ➤ Many devices available in both DIP and surface mount packages

Type Number	Package		Compatible Part	Production Availability	Description
TC8250AP	DIP16	RTC	TOSHIBA ORIGINAL	NOW	Real Time Clock/Calendar
TC8521AP	DIP18	RTC	TOSHIBA ORIGINAL	NOW	
TC8505AP	DIP40	CRTC	MOTO/HITACHI 6845 (NMOS) PINOUT	NOW	CRT Display Controller
TC8505AF	MFP44	CRTC	MOTO/HITACHI 6845 (NMOS) PINOUT	NOW	
TC85041F	QFP100	BIA	TOSHIBA ORIGINAL	NOW	Bus Interface Adapter PC/AT
TC8563AF, F	QFP60	VFO	TOSHIBA ORIGINAL	NOW	VFO for HDC
TC8564AF, F	QFP60	VFO	TOSHIBA ORIGINAL	NOW	
TC8565P	DIP40	FDC	NEC µPD 765 INTEL 8272A	NOW	Floppy Disk Controller
TC8565F	MFP44	FDC	NEC µPD 765 INTEL 8272A	NOW	
TC8566AF	MFP100	FDC	FDC WITH VCO	NOW	
TC8569AF	MFP80	FDC	TOSHIBA ORIGINAL	NOW	Floppy Disk Controller (Perpendicular Recording)
TC8576AF	MFP44	CPC	TOSHIBA ORIGINAL	NOW	Centronics I/O + RS232C
TC8577AP	DIP40	CPC	TOSHIBA ORIGINAL	NOW	Centronics Output + RS232C
TC8578AP	DIP40	CPC	TOSHIBA ORIGINAL	NOW	Centronics Input + RS232C
TC8554F	QFP100	ODC	TOSHIBA ORIGINAL	NOW	Error correction for optical disk
TC8570AP	QFP44	UART	TOSHIBA ORIGINAL	NOW	Universal Asynchronous R/T
TC8570AF	QFP44	UART	TOSHIBA ORIGINAL	NOW	

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Preliminary

High-Performance RISC Microprocessor **TC86R4600**

Toshiba's 64-bit TC86R4600 microprocessor along with advanced operating systems like Windows NT™ gives the PC manufacturer a favorable product differentiation over the rest of the PC manufacturers. Toshiba is protecting end-user software investments and also provides an open software environment by allowing TC86R4600-based systems to run a choice of advanced operating systems, such as Windows NT and UNIX®. The TC86R4600 processor operates at 100MHz internally (50MHz externally) and sustains performance in excess of 60 SPECmarks.

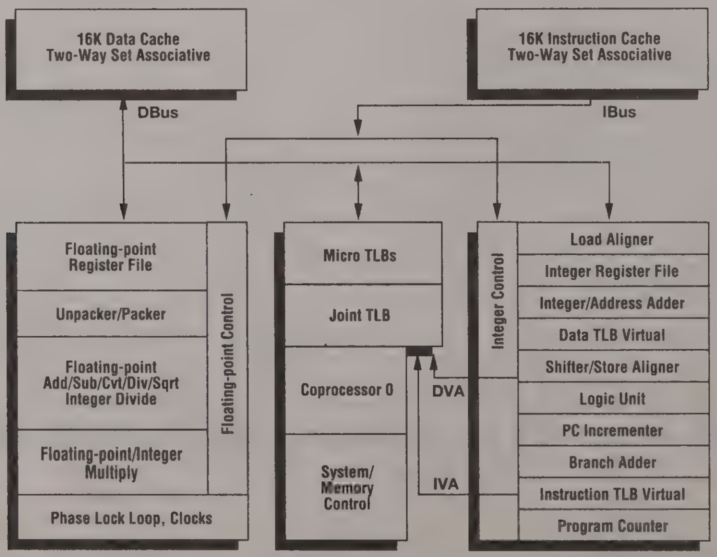
Overview

Toshiba's TC86R4600 microprocessor is a highly integrated, single-chip RISC microprocessor designed for high-performance mainstream PCs, high-performance notebook computers, and high-performance embedded applications. The TC86R4600 processor provides complete application software compatibility with the MIPS R2000, R3000, and R4000 processors. The TC86R4600 implements the extended MIPS instruction set architecture, and thus is fully compatible with applications running on earlier generation parts. The TC86R4600 includes the same additions to the instruction set as found in the R4000 family of the processors. The TC86R4600 provides a compatible, timely, and necessary path from 32-bit to true 64-bit computing for users and software developers.

Features

- ➤ Fully software compatible with R4000 RISC processor family
- ➤ Pin-compatible with R4000PC and R4400PC microprocessors
- ➤ True 64-bit microprocessor:
  - • 64-bit Integer operations
  - • 64-bit floating-point operations
  - • 64-bit registers
  - • 64-bit virtual address space
- ➤ High level of integration:
  - • 64-bit integer CPU and 64-bit floating-point unit
- ➤ Built-in first level instruction and data caches
  - • Two-way set associative caches
  - • 16KB instruction cache and 16KB data cache
  - • Fixed 32-byte line size
  - • Writeback with per-page-write-through option
- ➤ Low-power operation:
  - • 3.3V power supply
  - • Power consumption is approximately 4W @ 50MHz
  - • Extensive power-down of unused circuits with no performance penalty
  - • Standby mode reduces internal power to 30mW
- ➤ The TC86R4600 microprocessor is packaged in 179-pin ceramic PGA (pin compatible with 179-pin R4000PC and R4400PC) or 208-pin CQFP (Ceramic QFP)
- ➤ 100MHz internal and 50MHz external frequency

TC86R4600 Block Diagram


16K Data Cache
Two-Way Set Associative
16K Instruction Cache
Two-Way Set Associative
DBus
IBus
Floating-point Register File
Unpacker/Packer
Floating-point Add/Sub/Cvt/Div/Sqrt Integer Divide
Floating-point/Integer Multiply
Phase Lock Loop, Clocks
Floating-point Control
Micro TLBs
Joint TLB
Coprocessor 0
System/ Memory Control
DVA
IVA
Integer Control
Load Aligner
Integer Register File
Integer/Address Adder
Data TLB Virtual
Shifter/Store Aligner
Logic Unit
PC Incrementer
Branch Adder
Instruction TLB Virtual
Program Counter

TOSHIBA AMERICA ELECTRONIC COMPONENTS, INC.

Windows NT is a trademark of Microsoft Corporation.
UNIX is a registered trademark of UNIX System Laboratories, Inc.

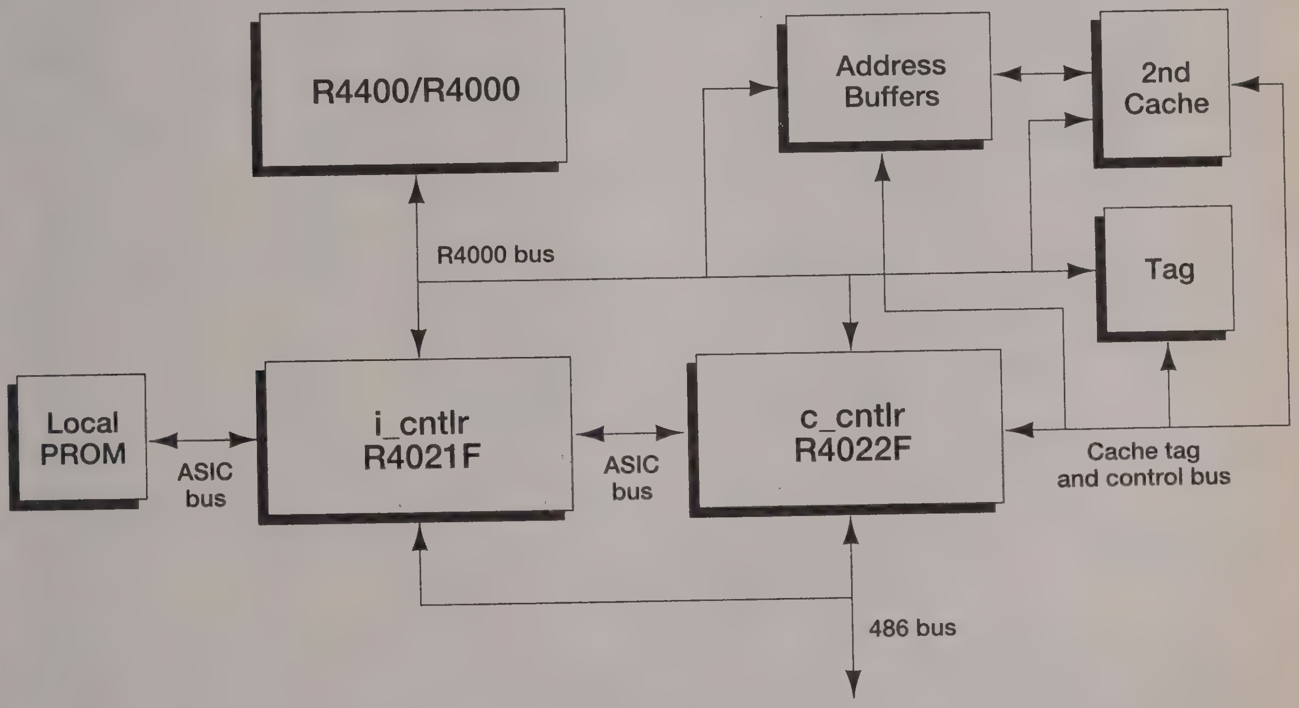
➤Tigershark Chipset Features:

- Converting R4000 SysAD system bus to 80486DX-25, 33, 50MHz system bus
- Support for 3.3V/5.0V

➤Support for R4000PC, R4400PC and R4600 processors

➤Build-in support for second level cache

- Direct-mapped
- 16- or 32-byte cache lines
- Write-through protocols
- Second-level cache timing is programmable
- Support for 64K-1M cache sizes


R4400/R4000
Address Buffers
2nd Cache
R4000 bus
Tag
Local PROM
ASIC bus
i_cntlr R4021F
ASIC bus
c_cntlr R4022F
Cache tag and control bus
486 bus

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TOSHIBA HIGH SPEED (HC), ADVANCED HIGH SPEED (AC) CMOS AND BiCMOS (BC and ABT) FUNCTION SELECTION GUIDE

FUNCTION			HIGH SPEED TC74HC	ADVANCED HIGH SPEED TC74AC	BICMOS	
					TD74ABT	TD74BC
GATE	NAND		00A, T00A, 03A, 10A, 20A, 30A, 132A, 133A	00,T00, 10, T20, T10		00
	NCR		02A, T02A, 27A, 4002A, 4007A, 4078A	02, T02		
	AND		08A, T08A, 09A, 11A, 21A	08, T08, 11		08
	OR		32A, T32A, 4072A, 4075A, 4078A	32, T32		32
	INVERTER		04A, U04A, T04A, 05A, 07A	04, T04, 05		
	SCHMITT TRIGGER		14A, 132A	14, T14		
	MULTIFUNCTION		51A, 86A, T86A, 266A, 386A, 7266A	86, T86		
BUFFER			4049A, 4050A, T7007A			
	3-STATE		125A, 126A, 240A, T204A, 241A, T241A, 244A, T244A, 365A, 366A, 367A, 368A, 540A, T540A, 541A, T541A, 7240A, 7241A, 7244A	125, 126, 240, T240, 241, T241, 244, T244, 367, 368, 540, T540, 541, T541	240, 241, 244 540, 541, 2240, 2241, 2244	230, 231, 240, 241, 244, 365, 366, 367, 368, 540, 541
	BIDIRECTIONAL		242A, 243A, 245A, T245A, 620A, 623A, 640A, T640A, 634A, T634A, 7640A, 7643A, 7645A	245, T245, 620, 623, 640, T640, 643, 646, T646, 648, T648	245, 543, 544, 620, 623, 640, 643	242, 243, 620, 623, 640, 643, 645
FLIP FLOP J-K TYPE			73A, 76A, 107A, 109A, 112A, 113A	109, T109, 112, T112		
	D TYPE		74A, T74A, 174A, T174A, 175A, 273A, T273A, 377A	74, T74, 174, T174, 175, T175, 273, T273, 377, T377		
		3-STATE	374A, T374A, 534A, T534A, 564A, T564A, 574A, T574A, 646A, 648A, T648A, 651A, T651A, 652A, T652A	374, T374, 534, T534, 564, T564, 574, T574, 646, T646, 648, T648, 821, T821, 823, T823, 825, T825	374, 534, 564, 574, 646, 648, 651, 652, 653, 654, 821, 822	374
LATCH			75A, 77A, 259A, 279A, 375A			
		3-STATE	373A, T373A, 533A, T533A, 563A, T563A, 573A, T573A	373, T373, 533, T533, 563, T563, 573, T573, 841, T841, 843, T843	373, 533,563, 573, 841, 842	373, 533, 563, 573
MULTIVIBRATOR			123A, 221A, 423A, 4538A			
DECODER			42A, 131A, 137A, T137A, 138A, T138A, 139A, T139A, 154A, 155A, 237A, 238A, 4028A, 4514A, 4515A	138, T138, 139, T139		
		7-SEGMENT	4511A, 453A			
ENCODER			147A, 148A			
REGISTER			164A T164A, 165A, 166A, 173A, 194A, 195A, 299A, 323A, 595A, 597A, 670A, 4094A, 40105A	164, T164, 166, 299, T299, 323, T323, 670		
COUNTER		BINARY	161A, 163A, 191A, 193A, 393A, 590A, 592A, 593A, 691A, 693A, 697A, 699A, 4520A	161, T161, 163, T163, 169, 191, 393		
		DECADE	160A, 162A, 190A, 192A, 390A, 690A, 692A, 696A, 698A, 4518A	160, 162, 390		
		DIVIDER	4017A, 4020A, 4022A, 4024A, 4040A, 4060A, 40102A, 40103A, 7292A, 7294A			
MULTIPLEXER		ANALOG	4016A, 4051A, 4052A, 4053A, 4066A, 4316A, 4351A, 4352A, 4353A			
		DIGITAL	151A, 153A, 157A, T157A, 158A, T158A, 251A, 253A, 257A, T257A, 258A, T258A, 298A, 352A, 353A, 354A, 356A	151, T151, 153, 157, T157, 158, T158, 251, T251, 253, 257, T257, 258, T258		
OTHER	COMPARATOR		85A, 688A, T688A	520, T520, 521, T521		
	ADDER		283A	283, T283		
	ALU		181A, 182A			
	PARITY TREE		280A	280, T280	280	

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TOSHIBA VERY HIGH SPEED (VHC), LOW VOLTAGE (LVQ, LVX) CMOS FUNCTION SELECTOR GUIDE

FUNCTION			VERY HIGH SPEED	LOW VOLTAGE	
			TC74VHC	TC74LVQ	TC74LVX
GATE	NAND		00, T00, 10, 20	00	00
	NOR		02, 27	02	02
	AND		08, T08, 11, 21	08	08
	OR		32	32	32
	INVERTER		04, T04, V04	04	04
	SCHMITT TRIGGER		14, 132	14	14
	EXCLUSIVE OR		86	86	86
BUFFER	3-STATE		125, 126, 240, T240, 244, T244, 367, 368, 540, T540, 541, T541	240, 241, 244	125, 240, 244
	BIDIRECTIONAL		245, T245	245	245
FLIP FLOP J-K TYPE			112, T112		
	D TYPE		74, T74, 174, 175, 273	74, 174, 273	74, 174, 273
		3-STATE	374, T374, 574, T574	374	374
LATCH		3-STATE	373, T373, 573, T573	373, 573	373, 573
MULTIVIBRATOR			123A, 221A		
DECODER			138, T138, 139, 238	138	138
REGISTER			164, 165, 299, T299, 595		
COUNTER		BINARY	161, 163, 393, 4040		
MULTIPLEXER		DIGITAL	153, 157, 257	151, 157	157

TOSHIBA STANDARD FUNCTION SELECTION GUIDE

GATE BUFFERS	NAND		TC4011BP/BF, TC4011UBP, TC4012BP/BF, TC4023BP/BF, TC4068BP/BF, TC7400BP
	NOR		TC4000BP, TC4001BP/BF, TC4001UBP, TC4002BP/BF, TC4025BF/BP, TC4078BP/BF
	AND		TC4068BP/BF, TC4073BP/BF, TC4081BP/BF, TC4082BP
	OR		TC4071BP/BF, TC4072BP/BF, TC4075BP/BF, TC4078BP/BF
	INVERTER		TC4007UBP/UBF, TC4009UBP/BF, TC4049BP/BF, TC4069UBP/UBF, TC7404UBP
	BUFFERS		TC4009UBP, TC4010BP, TC4049BP/BF, TC4050BP/BF
		3-STATE	TC4502BP, TC5012BP/BF, TC5024BP, TC5025BP
		OPEN DRAIN	TC40107BP, TC5029BP, TC5064BP, TC5065BP, TC5066BP, TC5067BP
	MULTIFUNCTION		TC4019BP/BF, TC4030BP/BF, TC4077BP//BF, TC4085BP, TC4086BP, TC4501BP, TC4519BP, TC4530BP, TC4572BP/BF
	SCHMITT TRIGGER		TC4093BP/BF, TC4583BP, TC4584BP/BF
	LEVEL SHIFTER		TC4009UPB, TC4010BP, TC4049BP/BF, TC4050BP/BF, TC5020BP
FLIP FLOP			TC4013BP/BF, TC4027BP/BF, TC40174BP/BF, TC40175BP/BF, TC7476BP
LATCHES			TC4042BP/BF, TC4043BP, TC4044BP/BF, TC4099BP/BF, TC4508BP
MULTIVIBRATORS			TC4047BP, TC4528BP/BF, TC4538BP/BF
DECODERS			TC4028BP/BF, TC4514BP, TC4515BP, TC4555BP, TC4556BP/BF
DISPLAY DRIVER	LED		TC4511BP/BF, TC5002BP, TC5022BP
	LCD		TC4054BP/BF, TC4055BP, TC4056BP/BF, TC4543BP/BF
	DIGITRON		TC5068BP, TC5069BP
ENCODER			TC4532BP
REGISTERS	SHIFT		TC4006BP, TC4014BP, TC4015BP/BF, TC4021BP, TC4034BP, TC4035BP TC4094BP/BF, TC40104BP, TC40194BP, TC5050P
	STORAGE		TC4076BP
COUNTERS	BINARY		TC4029BP/BF, TC40161BP, TC40163BP, TC40193BP, TC4516BP/BF, TC4520BP/BF TC5018BP, TC5027BP
	DECADE		TC40209BP/BF, TC40160BP, TC40162BP, TC40192BP, TC4510BP/BF, TC4518BP/BF TC5026BP
	DIVIDER		TC4020BP/BF, TC4024BP/BF, TC4040BP/BF, TC4521BP, TC5036P, TC5048P
	DIVIDE-BY-“N”		TC4018BP, TC40102BP, TC40103BP, TC4522BP, TC4526BP/BF
	N-DIGIT DECADE		TC5001P, TC5032P, TC5037P, TC5051P, TC5052P, TC5053P, TC5054P, TC5070P
	OTHER		TC4017BP/BF, TC4022BP
TIMERS			TC5043P, TC5071P, TC5072P
MULTI-PLEXERS	ANALOG		TC4051BPBG, TC4052BP/BF, TC4053BP/BF
	DIGITAL		TC4512BP/BF, TC4539BP.BF, TC5023BP
ARITHMETIC CIRCUITS	ADDER		TC4008BP, TC4032BP, TC4038BP, TC4560BP
	COMPARATOR		TC4063BP/BF, TC4585BP
	PARITYTREE		TC4531BP
	RATE MULTIPLIER		TC4527BP
	9’s COMPLEMENTER		TC4561BP
MEMORIES (RAM)			TC4036BP, TC4039BP
A/D CONVERTERS			TC5090AP, TC5091AP, TC5092AP, TC5093AP
ANALOG SWITCH			TC4016BP/BF, TC4066BP/BF
OTHER			TC40117BP

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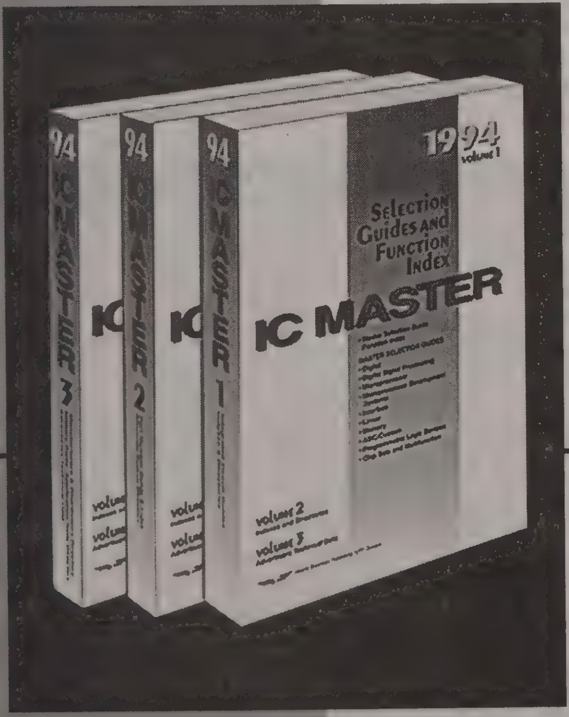

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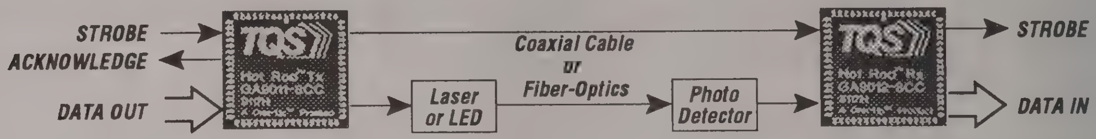


TriQuint's Computing and Networking division offers solutions to bottlenecks in high-speed workstations and personal computers. These +5V, fully TTL-compatible circuits are 100% compatible with existing silicon ICs, making them natural companions to CMOS gate arrays and all popular microprocessors.

Hot Rod™ Devices

Part #	Description	Line Rate	Package
GA9011-xCC	Hot Rod Transmitter	250–1000 Mbaud	68-Pin CLCC
GA9012-xCC	Hot Rod Receiver	250–1000 Mbaud	68-Pin CLCC

ESCON™ and Fiber Channel Devices

Part #	Description	Line Rate	Package
FC-200	ESCON Chip Set	200 Mbaud	3 Chips
FC-265	Fiber Channel Chip Set	265.625 Mbaud	3 Chips
FC-1000	Fiber Channel Chip Set	1000 Mbaud	3 Chips
GA9040A	Fiber-Optic Module Set	800 Mbit/s	3 Modules

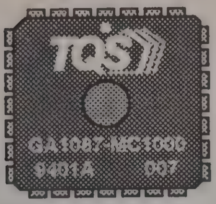
Interface Cards

Part #	Description	Line Rate	Max. Link
HRC-xxxC	Hot Rod Coax Card	250–1000 Mbaud	10-30 meters
HRC-xxxFS	Hot Rod F-Optic Card - CD Laser	250–1000 Mbaud	2 Km-300 m
HRC-800FLC	Hot Rod F-Optic Card -1300nm Laser	1000 Mbaud	10 Km
FCC-200FL	Fiber Channel Fiber-Optic Card	200 Mbaud	3 Km
FCC-265FL	Fiber Channel Fiber-Optic Card	265.625 Mbaud	2 Km
FCC-266FL	Fiber Channel Fiber-Optic Card	265.625 Mbaud	2 Km
FCC-265C	Fiber Channel Coax Card	265.625 Mbaud	100 ft.

Development Systems

The Hot Rod and ESCON / Fiber Channel Development Systems provide a convenient means for evaluating and testing data communications media and TriQuint's interface cards and chip sets. With a user-supplied terminal or PC, the Development System is ideal for use in both prototyping and production test environments.

SYSTEM TIMING

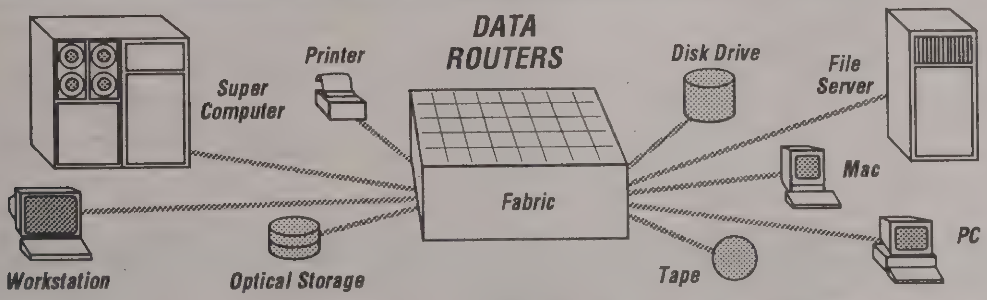


TriQuint pioneered the design and manufacture of precision clocking devices with ultra low skew and features such as output edge placement, selectable harmonics and subharmonics, and precision control of phase shift and pulse widths.

System Timing Devices

Part #	Description	Input Frequency	Package
GA1085	11-Output Configurable Clock Buffer	24 - 105 MHz	28-Pin MQuad
GA1087	11-Output Configurable Clock Buffer	24 - 105 MHz	28-Pin MQuad
GA1088	11-Output Configurable Clock Buffer	18 - 105 MHz	28-Pin MQuad
GA1089	11-Output Configurable Clock Buffer	65 - 90 MHz and 130 - 180 MHz	28-Pin MQuad
TQ1086L	11-Output Configurable Clock Buffer	18 - 105 MHz	28-Pin MQuad
GA1086	11-Output Clock Buffer	30 - 80 MHz	28-Pin MQuad
TQ2060	High-Frequency Clock Generator	300 - 400 MHz	28-Pin MQuad
TQ2061	High-Frequency Clock Generator	500 - 600 MHz	28-Pin MQuad
GA1000	Custom Clock Buffer	20 - 80 MHz	16-Pin DIP or 28-Pin MQuad
GA1110E	Multi-Phase Clock Buffer	20, 25, 33, 40, 50 MHz	16-Pin DIP or 28-Pin MQuad
GA1210E	Clock Doubler/2-Phase Generator	20, 25, 33, 40, 50 MHz	16-Pin DIP or 28-Pin MQuad

SPECIALTY PRODUCTS



TriQuint's Digital Communications and Signal Processing division provides products for telecommunications, advanced signal processing and military and aerospace applications. Representative of TriQuint's specialty products are the following:

Cross Point Switches, D-to-A Converters, Line Drivers

Part #	Description	Speed	Package
TQ8016-M	16 x 16 Digital Cross Point Switch	1.3 Gbit/s	132-Pin Ceramic
TQ8032-M	32 x 32 Digital Cross Point Switch	800 Mbit/s	196-Pin Ceramic
TQ6122-M	8-Bit D-to-A Converter	1 Gsample/s	44-Pin Ceramic
TQ6140	14-Bit D-to-A Converter	1 Gsample/s	44-Pin Ceramic
TQ6332-M	Variable-Amplitude Line Driver	130 ps. P-to-P	44-Pin Ceramic

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QLSI STANDARD CELLS

TriQuint provides powerful solutions to the industry's most difficult challenges. QLSI Standard cells have demonstrated excellence in delivering solutions in the following areas:

Precision 2.5 GHz ASIC Design

Application	Example
Time-Division Multiplexing	622 Mbit/s to 2.5 Gbit/s and higher
Clock Generation	Internal Low-Jitter PLLs up to 2.5 Gbit/s
Direct Digital Synthesis	1 GHz clock rates with on-board DACs
Mixed Signal	Pin Electronics
Data Path	Building Block Arithmetic Functions

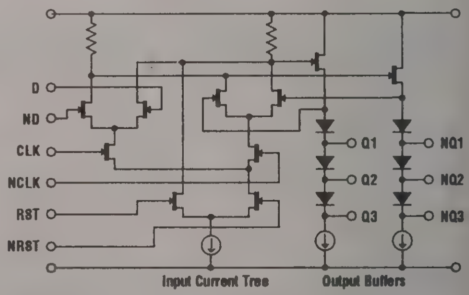
TriQuint leads the market in high-performance GaAs ASICs with a structured custom methodology. The keys to delivering precision ASIC design involoves these elements:

Process

Our mature 0.9 µm airbridge GaAs process is the basis for our QLSI standard cell family. TriQuint is introducing a next-generation standard cell family, based on a 0.6 µm process to provide improved performance and density.

Circuit Family

QLSI is based on a circuit topology called Source-Coupled FET Logic (SCFL). This logic family is ideal for delivering high-performance circuits for data flow architectures. SCFL is fully differential, with a three-level current-steering logic family. QLSI's basic efficiency can be seen in this sample, which implements a Master Latch with Reset in one "unit cell."



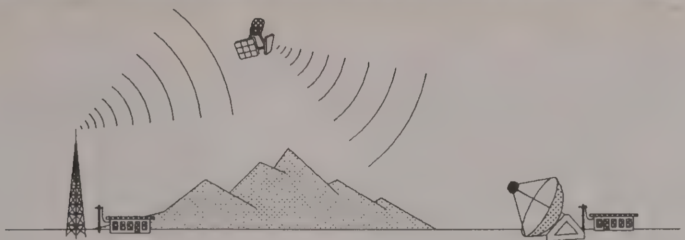
Performance

QLSI's performance is demonstrated by what can be done with one unit cell. The following specifications are worst-case performance of cells driving a fanout of two, driving 1 mm of interconnect, over variations in process, temperature and voltage.

Cell	Specification	Value
Flip-Flop	Max. toggle rate	2.5 GHz
	Setup / Hold	216 ps
2-Input NOR	Prop. delay	142 ps
4:1 Mux	Prop. delay	152 ps

QLSI standard cells are available for both commercial and military temperature ranges. Densities to 5000 equivalent gates are achievable in both package and die form. Please request the QLSI Standard Cell Manual for more information.

WIRELESS COMMUNICATIONS



TriQuint's Wireless Communications division offers a broad spectum of RFIC products and services. Solutions include standard RFIC products, custom designs and foundry services. TriQuint's expertise ranges from high-volume commercial applications, such as cellular telephones, wireless LANs and GPS, to high-reliability satcomm applications.

Standard RFIC Components

Part #	Description	Speed	Package
TQ9111N	1-8 GHz Amplifier	1-8 GHz	20-Pin Ceramic
TQ9113N	IF/AGC Amplifier	30-500 MHz	8-Pin SOIC
TQ9114N	IF/AGC Amplifier	30-500 MHz	8-Pin SOIC
TQ9121N	Low-Noise Amplifier	1.2-1.6 GHz	8-Pin SOIC
TQ9121F	Low-Noise Amplifier	1.2-1.6 GHz	8-Pin Flat Pack
TQ9122N	Low-Noise Amplifier	100-2500 MHz	8-Pin SOIC
TQ9132N	50 mW Power Amplifier	800-2500 MHz	8-Pin SOIC
TQ9151	SPDT Reflective Switch w/TTL Driver	DC - 10 GHz	20-Pin Ceramic
TQ9152	SPDT Reflective Switch (no Driver)	DC - 10 GHz	20-Pin Ceramic
TQ9153	SPDT Absorptive Switch w/Driver	DC - 10 GHz	20-Pin Ceramic
TQ9172N	Active-Frequency Mixer	150-2500 MHz	8-Pin SOIC
TQ9201J	Low-Current RFIC Downconverter	500-1600 MHz	14-Pin SOIC
TQ9203J	Low-Current RFIC Downconverter	800-1000 MHz	14-Pin SOIC
TQ9205K	2.4 GHz Amplifier/Switch Front End	2.4 GHz	24-Pin SSOP
TQ9206	2.4 GHz Up/Down Converter	2.4 GHz	24-Pin SSOP
TQ9272P	Gen.-Purpose RFIC Downconverter	500-2500 MHz	20-Pin Ceramic

RFIC DESIGN CENTER

Design Center Features

Extensive design and training are available for customers interested in their own RFIC design and development capabilities. TriQuint has several state-of-the-art GaAs processes to accommodate a wide range of customer applications.

- Custom turnkey design services
  - Circuit simulations, layout
  - Testing, verification
- IC design consulting and training
  - Classes, design manuals, simulation models
- Flexible choice of processes
  - 1D, 1A: 1-μm Depletion-mode
  - HA: 0.5-μm Depletion-mode; Ft to 21 GHz
  - QED/A: 1-μm E/D-mode; Ft to 15 GHz
- Volume production capabilitiy
  - Fully automated 4" wafer processing
  - Wafer sawing
  - Advanced packaging capability
  - Die sort and package testing
- Support services

TriQuint SEMICONDUCTOR

- **Wireless Communications**

3625A SW. Murray Blvd.
Beaverton, OR 97005
Tel: (503) 644-3535
Fax: (503) 644-3198

- **Digital Communications and Signal Processing**

3625A SW. Murray Blvd.
Beaverton, OR 97005
Tel: (503) 644-3535
Fax: (503) 644-3198

- **Computing and Networking**

2300 Owen Street
Santa Clara, CA 95054
Tel: (408) 982-0900
Fax: (408) 982-0222

UTMC's ASIC design capabilities consist of flexible design methodologies including array-based and cell-based, as well as multiple design services and interfaces. UTMC's semicustom products offer densities of up to 100,000 usable gates and are fabricated in advanced silicon gate CMOS processes which include UTE/-R (1.2µ drawn, 0.9µ leff) and UTD/-R (1.5µ drawn, 1.2µ leff). Designed specifically for high-reliability applications, UTMC ASICs are available in Class B, Class S, Jan, and radiation-hardened quality levels. They meet radiation hardness requirements up to 3.0E6 rads(Si) total dose functional and less than 1.0E-10 SEU hardness.

Array-based Products

1.2µ (0.9µ leff) UTE/-R Gate Array Family

Device[1]	Equivalent Usable Gates[2]	I/O Circuits		
		Signal	Power & Ground	Total
UTE25D/-R	25,000	176	40	216
UTE35T/-R	35,000	176	40	216
UTE75D/-R	75,000	256	80	296
UTE100T/-R	100,000	256	80	296

Notes:
1. The -R denotes the radiation-hardened option.
2. Based on NAND2 equivalents. Actual usable gate count is design-dependent. Estimates reflect a mix of functions, including RAM.
3. The number of usable device V_O pads may be limited by the selected package, pinout, and use of JTAG option.

1.5µ (1.2µ leff) UTD/-R Gate Array Family

Device[1]	Equivalent Usable Gates[2]	I/O Circuits		
		Signal	Power & Ground	Total
UT116D/-R	3,400	100	16	116
UT160D/-R	6,000	136	24	160
UT180D/-R	7,800	156	24	180
UT212D/-R	11,000	186	32	212

Notes:
1. The -R denotes the radiation-hardened option.
2. Based on NAND2 equivalents. Actual usable gate count is design-dependent.
3. The number of usable device V_O pads may be limited by the selected package and pinout.

Cell-based Products

UTMC's cell-based capabilities offer high levels of functional integration in both UTE/-R and UTD/-R processes. This design methodology is supported by an extensive cell library which includes a variety of macros and analog functions. Using the cell-based approach, complex designs including data paths, state machines, RAM, ROM, and analog functions can be integrated on a single ASIC with maximum layout flexibility and efficiency.

EDA Support

UTMC's libraries and tools run on Mentor® and Cadence® workstations and are integrated with a host of other design and analysis tools. Using a combination of state-of-the-art proprietary and third-party design tools, UTMC delivers the EDA support and capability to handle complex, high-performance ASIC designs. In addition, UTMC supports design translation and synthesis to and from VHDL, EDIF, and FPGA source files, and third-party netlists.

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Cadence is a registered trademark of Cadence Design Systems, Inc.

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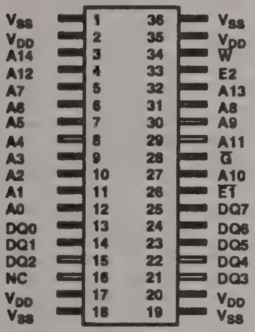
For more information call 1-800-645-UTMC.

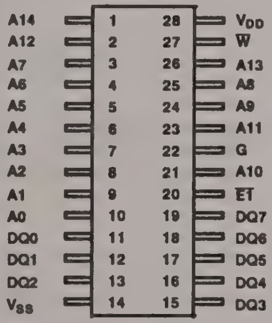
Rad-Hard SRAMs

FEATURES -- UT7156 SEU-Hard SRAM

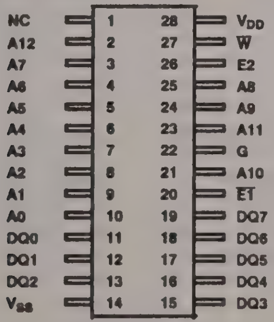
- ☐ Asynchronous operation for compatibility with industry-standard 32K x 8 SRAM
- ☐ 45ns maximum address access time, LET threshold greater than 70 MeV-cm^2/mg (-55°C to +125°C)
- ☐ CMOS and TTL compatible input and output levels
- ☐ Three-state bidirectional data bus
- ☐ Low operating and standby current
- ☐ Full military operating temperature range, -55°C to +125°C, screened to specific test methods listed in Table I MIL-STD-883 Method 5004 for Level S or Level B
- ☐ Radiation-hardened process and design; total dose irradiation testing to MIL-STD-883 Method 1019
  - Total-dose: 1.0E6 rads(Si)
  - Dose rate upset: 1.0E9 rads(Si)/sec
  - Dose rate survival: 1.0E12 rads(Si)/sec
  - LET threshold: > 70 MeV-cm^2/mg
  - Latchup immune
- ☐ Post-radiation AC/DC performance characteristics guaranteed by MIL-STD-883 Method 1019 testing at 1.0E6 rads(Si)
- ☐ Packaging options:
  - 36-pin 50-mil center flatpack (0.7 x 1.0)
  - 28-pin 100-mil center DIP (.600 x 1.4)
- ☐ 5-volt operation


VSS 1 36 VSS
VDD 2 35 VDD
A14 3 34 W
A12 4 33 E2
A7 5 32 A13
A6 6 31 A8
A5 7 30 A9
A4 8 29 A11
A3 9 28 G
A2 10 27 A10
A1 11 26 E1
A0 12 25 DQ7
DQ0 13 24 DQ6
DQ1 14 23 DQ5
DQ2 15 22 DQ4
NC 16 21 DQ3
VDD 17 20 VDD
VSS 18 19 VSS

32K x 8 SRAM Pinout (36)


A14 1 28 VDD
A12 2 27 W
A7 3 26 A13
A6 4 25 A8
A5 5 24 A9
A4 6 23 A11
A3 7 22 G
A2 8 21 A10
A1 9 20 E1
A0 10 19 DQ7
DQ0 11 18 DQ6
DQ1 12 17 DQ5
DQ2 13 16 DQ4
VSS 14 15 DQ3

32K x 8 SRAM Pinout (28)


NC 1 28 VDD
A12 2 27 W
A7 3 26 E2
A6 4 25 A8
A5 5 24 A9
A4 6 23 A11
A3 7 22 G
A2 8 21 A10
A1 9 20 E1
A0 10 19 DQ7
DQ0 11 18 DQ6
DQ1 12 17 DQ5
DQ2 13 16 DQ4
VSS 14 15 DQ3

8K x 8 SRAM Pinout (28)

For more information call 1-800-645-UTMC.

FEATURES -- UT67164 SEU-Hard SRAM

- ☐ Asynchronous operation for compatibility with industry-standard 8K x 8 SRAM
- ☐ JAN Class S QPL listed 5962-38294
- ☐ 55ns maximum address access time, LET threshold greater than 45 MeV-cm^2/mg (-55°C to +125°C)
- ☐ TTL-compatible input and output levels
- ☐ Three-state bidirectional data bus
- ☐ Low operating and standby current
- ☐ Full military operating temperature range, -55°C to +125°C, screened to specific test methods listed in Table I MIL-STD-883 Method 5004 for Level S or Level B
- ☐ Radiation-hardened process and design; total dose irradiation testing to MIL-STD-883, Method 1019
  - Total dose 1.0E6 rads(Si)
  - Dose rate upset 1.0E9 rads(Si)/sec
  - Dose rate survival 1.0E12 rads(Si)/sec
  - LET threshold: > 45 MeV-cm^2/mg
  - Latchup immune
- ☐ Post-radiation AC/DC performance characteristics guaranteed by MIL-STD-883 Method 1019 testing at 1.0E6 rads(Si)
- ☐ Packaging options:
  - 28-pin 100-mil center DIP (0.600 x 1.4)
  - 28-pin 50-mil center flatpack (0.700 x 0.75)
- ☐ 5-volt operation

PIN NAMES

A(14:0) A(12:0)	Address	$\overline{W}$	Write
DQ(7:0)	Data Input/Output	$\overline{G}$	Output Enable
$\overline{E1}$	Enable 1	V_{DD}	Power
E2	Enable 2	V_{SS}	Ground

Device Operation Truth Table

$\overline{G}$	$\overline{W}$	$\overline{E1}$	E2	I/O Mode	Mode
X[1]	X	X	0	3-state	Standby
X	X	1	X	3-state	Standby
X	0	0	1	Data in	Write
1	1	0	1	3-state	Read[2]
0	1	0	1	Data out	Read

Notes:
1. "X" is defined as a "don't care" condition.
2. Device active; outputs disabled.

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1553/1773 UT69151 SµMMIT™ Family

FEATURES

☐ Serial µ-coded Monolithic Multi-mode Intelligent Terminal (SµMMIT)

☐ Comprehensive MIL-STD-1553 dual redundant Bus Controller (BC), Remote Terminal (RT), and Monitor Terminal (MT)

☐ Compliant MIL-STD-1553B Notice II RT

☐ MIL-STD-1773 compatible

☐ Internal illegalization in the RT mode of operation

☐ Full 16-bit (R/W) time-tag with user-defined resolution

☐ Simultaneous RTl/MT mode of operation

☐ Powerful BC instruction set with 15 opcodes and 7 condition codes

☐ Autonomous operation in all three modes of operation
- ROM initialization

☐ Flexible host interface with DMA architecture

☐ Programmable interrupt scheme with internally-generated interrupt history list available

☐ Built-In-Test capability

☐ Supports IEEE Standard 1149.1 (JTAG)

☐ Assembler available to ease programming

☐ Built on a low-power, 1.2µ CMOS process

☐ Standard Military Drawings available

INTRODUCTION

The UT69151 SµMMIT family provides the system designer with an intelligent solution to MIL-STD-1553 multiplexed serial data bus design problems. The SµMMIT family implements all three of the defined MIL-STD-1553 functions - Remote Terminal, Bus Controller, and Monitor. Operating either autonomously or with a tightly coupled host, the SµMMIT family can solve a wide range of MIL-STD-1553 interface problems. A powerful RISC processing unit provides automatic message handling, message status, general status, and interrupt information. The register-based interface architecture provides many programmable functions as well as extensive information pertinent to device maintenance.

Using MCM-C package technology, the SµMMIT Family integrates transceiver, memory, and a memory management unit into a single package. Component integration via package technology supplies system designers with a proven low risk solution to the MIL-STD-1553 interface problem.

Features	SµMMIT	SµMMIT LX/DX	SµMMIT XT
Internal Transceivers	No	Yes	Yes
Internal Memory	No	No	32K x 16
External Memory	64K x 16	64K x 16	No
Internal Memory Management	No	No	Yes
Package Offerings	84-pin Pingrid Array 84-lead Flatpack	96-pin Pingrid Array 100-lead Flatpack	140-pin Pingrid Array 140-lead Flatpack
Package Area	1.2in^2	1.3in^2	1.9in^2
MIL-STD-1773 Compatible	Yes	No	No
BC, RT, and MT	Yes	Yes	Yes
Power Supplies	5 volt only	5 volt only -15 volt and 5 volt -12 volt and 5 volt	5 volt only -15 volt and 5 volt -12 volt and 5 volt

SµMMIT is a trademark of United Technologies Microelectronics Center, Inc.

For more information call 1-800-645-UTMC.

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Rad-Hard Programmable Logic

FEATURES -- UT22VP10 RPAL

☐ High speed Universal RPAL
  - t_{PD}: 25ns maximum (CMOS)
    30ns maximum (TTL)
  - f_{MAX}: 30MHz maximum
  - Supported by industry-standard programers
  - Amorphous silicon anti-fuse

☐ Asynchronous & synchronous RPAL operation
  - Synchronous PRESET
  - Asynchronous RESET and PRELOAD

☐ Up to 22 input and 10 output drivers may be configured
  - CMOS & TTL-compatible input and output levels
  - Three-state output drivers

☐ Variable product terms, 8 to 16 per output

☐ 10 user-programmable output macrocells
  - Registered or combinatorial operation
  - Output driver polarity control selectable
  - 2 feedback paths available

☐ Low operating current
  - I_{DD}: 60ma + 1.5mA/MHz

☐ V_{DD}: 5.0 volts ± 10%

☐ Radiation-hardened process and design; total dose irradiation testing to MIL-STD-883, Method 1019
  - Total dose: 1.0E6 rads(Si)
  - Single event effects:
    Upset threshold 42 MeV-cm^2/mg (min)
    Latchup immune
  - Dose rate upset: 1.0E8 rads(Si)/sec
  - Dose rate survival: 1.0E10 rads(Si)/sec
  - Neutron fluence: 1.0E14 n/cm^2

☐ QML Q & V compliant part (check factory for availability)

☐ Packaging options:
  - 24-pin 100-mil center DIP (0.300 x 1.2)
  - 24-lead flatpack
  - 28-lead quad-flatpack

FEATURES -- UT28F256 PROM

☐ Programmable, read-only, asynchronous, radiation-hardened, 32K x 8 memory
  - Supported by industry standard programmers

☐ 45ns maximum address access time (-55 °C to +125 °C)

☐ TTL and CMOS compatible input and output levels

☐ Three-state data bus

☐ Low operating and standby current
  - Operating: 155mA maximum (@22.2MHz
  - Standby: 1mA maximum (post-rad)
  - Derating: 7mA/MHz

☐ Radiation-hardened process and design; total dose irradiation testing to MIL-STD-883, Method 1019
  - Total dose: 1.0E6 rads(Si)
  - Single event effects:
    Upset threshold 80 MeV-cm^2/mg (min)
    Latchup Immune
  - Dose rate upset: 1.0E8 rads(Si)/sec
  - Dose rate survival: 1.0E10 rads(Si)/sec
  - Neutron fluence: 1.0E14 n/cm^2

☐ QML Q & V compliant part (check factory for availability
  - AC and DC testing at factory

☐ Packaging options:
  - 28-pin 100-mil center DIP (0.600 x 1.4)
  - 28-lead 50-mil center flatpack (0.700 x 0.75)
  - 28-lead 50-mil center flatpack (0.490 x 0.74)

☐ V_{DD}: 5.0 volts ± 10%

For more information call 1-800-645-UTMC.

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Product Selection Guide

USAR
systems

KeyCoder™ ICs and Boards
HCMOS Keyboard Encoders

Features

- **Off-the-shelf availability**
- For PC/XT/AT/PS2, RS232, DEC, SUN, ACCESS.bus or HP-HIL systems
- 8042 auxiliary port for external keyboard, mouse, barcode reader, etc.
- Custom versions available
- Wide temperature range, –40°c to +85°c
- Low power consumption, 5 and 3 volt operation
- Quad Flat Pack, PLCC or DIP package options
- Affordable evaluation kits are immediately available

Applications

- Laptop/notebook keyboards
- Control panels
- POS Systems
- Foreign language terminals
- Test and measurement equipment
- Automatic teller machines
- Specialized data entry devices
- Mobile computing devices
- Industrial keyboards/keypads
- Pen-based computers
- Medical instruments
- DEC compatible keyboards
- Software specific input devices
- Instrumentation
- Single-board and chip set based systems
- Energy Star™ Computers

USAR PART NUMBER	MAX NO OF KEYS	SCANNING MODE	STATUS LEDS	COMMUNICATION PROTOCOL	AUX PORT	PACKAGE*	BOARDS AVAILABLE	COMMENTS
CUSTOM CONTROL PANELS AND KEYPADS								
K25C81	144	Two-Key Inhibit		PC/XT/AT/PS2	Yes	40-P 44-FN 44-FB	Yes	Single chip solution. Supports additional external keyboard. Maintains data integrity of custom keypads.
S25C8	144	Two-Key Inhibit		RS232		40-P 44-FN 44-FB		Serial encoder with optical knob interface.
LAPTOP/NOTEBOOK, STANDARD AND LARGE KEYBOARDS								
UR5HC408	144	N-Key Rollover		PC/XT/AT/PS2	Yes	40-P 44-FN 44-FB	Yes	Supports multiple key combinations. Suitable for large keyboards.
UR5HC418	128	N-Key Rollover	Yes	PC/XT/AT/PS2	Yes	40-P 44-N 44-FB	Yes	Support of integrated pointing device and all functions of 101/102 standard keyboard.
UR5HCFJL	128	N-Key Rollover	Yes	PC/XT/AT/PS2	Yes	40-P 44-FN 44-FB	Yes	Self-power management. Lowest power consumption for battery systems.
UR5HCFJ8	82	N-Key Rollover	Yes	PC/XT/AT/PS2	Yes	40-P 44-FN 44-FB	Yes	Interfaces Fujitsu and other laptop/notebook keyboards to BIOS compatible systems.
USER-PROGRAMMABLE								
UR5HC439	128	N-Key Rollover	Yes	PC/XT/AT/PS2	Yes	40-P 44-FN 44-FB	Yes	RAM programmable key assignments.
UR5HC449	144	N-Key Rollover	Yes	PC/XT/AT/PS2 or RS232	Yes	52-FN 64-FB	Yes	User-programmable keys including macros. Retains data without battery support.
INTEGRATED POINTING DEVICES								
UR5HCDMP	3		Yes	PS2/RS232			Yes	Dome point integrated pointing devices.
PROTOCOL CONVERTERS								
UR6HCPCS	PC/XT/AT/PS2 to RS232					40-P 44-FN 44-FB	Convert PC/XT/AT/PS2 keyboard communication protocol to RS232, Parallel, or HP-HIL. Interface inexpensive PC keyboards to proprietary systems.	
UR6HCPCP	PC/XT/AT/PS2 to Parallel							
UR6HCPCH	PC/XT/AT/PS2 to HP-HIL							
NEW INTERFACES								
NEW **Interfaces for HP-HIL, SUN, ACCESS.bus**	New set of input device encoders to interface a variety of input devices - including custom keyboards, keypads, PS2 style mice, and pointing devices, etc. - to HP-HIL, SUN & ACCESS.bus compatible systems.							

Package Definitions*
P Dual-in-Line Plastic **FN** (PLCC) **FB** Quad Flat Pack

For technical data and other information, contact
Customer Support, Tel. 212.226.2042
Fax. 212.226.3215

USAR SYSTEMS, INC., 568 BROADWAY, NO. 405, NEW YORK, NY 10012

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THE WESTERN DESIGN CENTER, INC.

2166 East Brown Road • Mesa, Arizona 85213 • 602-962-4545 • FAX 602-835-6442

The Western Design Center, Inc. (WDC), was founded in 1978 in Mesa, Arizona. The company designs, licenses, and sells microprocessors and microcomputers. WDC is known primarily for its W65C product line, which includes enhanced CMOS versions of the 6502 microprocessor.

WDC licenses its core microprocessors for application specific uses.

Microprocessors

W65C02S CMOS 8-bit Microprocessor offers complete hardware and software compatibility with existing 6500 series products as well as significant enhancements. Ten new instructions (twenty-nine new opcodes) and two new addressing modes have also been added. The W65C02S is able to run at higher clock speeds than the previous designs and is fully static. The popularity of the 6502 instruction set and small die size make the W65C02S an excellent choice as a core microprocessor in single-chip microcomputer ASIC devices. Available in a 40 lead plastic DIP, 44 lead PLCC, 44 lead QFP or as die.

KEY FEATURES: ▲CMOS low power process with microamp standby current ▲Wide operating voltage range, 1.2-6.0V ▲66 microprocessor instructions ▲180 operational codes ▲15 addressing modes ▲64K-byte addressable memory ▲Power management instructions ▲BE pin controls I/O state of data bus, address bus and RWB ▲Early address valid allows use with slower, lower cost memories ▲Decimal and binary arithmetic ▲Pipeline architecture ▲Variable length stack ▲Interrupt capability ▲Non-maskable interrupt ▲"Ready" input ▲Bit manipulation instructions.

W65C816S CMOS 16-bit Microprocessor features total software compatibility with the 8-bit W65C02S. The W65C816S extends addressing to a full 16 megabytes. A software switch determines whether the processor is in the 8-bit "emulation" mode, or in the native mode, thus allowing existing systems to use the expanded features. The ABORT input can interrupt the currently executing instruction without modifying internal register, thus allowing virtual memory system design. Available in a 40 lead plastic DIP, 44 lead PLCC, 44 lead QFP or as die.

KEY FEATURES: ▲CMOS low power process with microamp standby current ▲Wide operating voltage range, 1.2-6.0V ▲Emulation mode allows complete hardware and software compatibility with 6502 designs ▲24-bit address bus allows access to 16 MBytes of memory space ▲Full 16-bit ALU, Accumulator, Stack Pointer and Index Registers ▲Abort (ABORT) input and associated vector supports virtual memory system design ▲Separate program and data bank registers allow program segmentation of full 16 MByte linear addressing ▲New Direct Register and stack relative addressing provides capability for re-entrant, re-cursive and re-locatable programming ▲24 addressing modes-13 original 6502 modes with 91 instructions using 255 opcodes ▲Wait-for Interrupt (WAI) and Stop-the-Clock (STP) instructions further reduce power consumption, decrease interrupt latency and allows synchronization with external events ▲Block move ability.

Microcomputers

W65C134S CMOS 8-bit Microcomputer is a complete fully static 8-bit microcomputer fabricated on a single chip using a low power CMOS process. The W65C134S complements the W65C02S 8-bit microprocessor. The following features make the static W65C134S a leading candidate for hi-rel and medical industry applications. Available in a 68 lead PLCC or 80 lead QFP surface mount.

KEY FEATURES: ▲CMOS low power process with microamp standby current ▲Wide operating voltage range, 1.0-6.0V ▲W65C02S compatible CPU ▲Single chip microcomputer: 56 CMOS compatible I/O lines, 4096x8 ROM; 192x8 RAM ▲Low power modes ▲Twenty-two priority encoded interrupts ▲UART 7/8-bit w/wo odd or even parity ▲64K byte linear address space ▲4x16 bit time/counters ▲Bus control register for external memory ▲Internal or external ROM ▲8 decoded Chip Select outputs ▲Real time clock features ▲Industry standard development support tools for all languages.

W65C265S CMOS 16-bit Microcomputer is a complete fully static 16-bit microcomputer. The W65C265S complements the W65C816S 16-bit microprocessor. The following features make the W65C265S a leading candidate for 16-bit microcomputer applications. Available in a 80 lead PLCC or 100 lead QFP surface mount.

KEY FEATURES: ▲CMOS low power process with microamp standby current ▲Wide operating voltage range, 1.0-6.0V ▲W65C816S compatible CPU ▲Single chip microcomputer: 2 Tone Generators, 64 CMOS compatible I/O lines, 8Kx8 ROM; 576x8 RAM, fast oscillator start and stop feature ▲16Mbyte linear address space ▲Twenty-nine priority encoded interrupts ▲Four UART's ▲Time of Day (ToD) clock features ▲8x16 bit timer/counters ▲Bus Control Register ▲8 Programmable chip select outputs ▲Industry standard development support tools for all languages.

Peripheral

W65C22S CMOS Versatile Interface Adaptor (VIA) is a flexible I/O device for use with the W65C series microprocessor family. Two program controlled 8-bit directional peripheral I/O ports allow direct interfacing between the microprocessor and selected peripheral units. Each port has input data latching capability. Two programmable Data Direction Registers allow selection of data direction (input or output) on an individual line basis. Also provided are two programmable 16-bit interval timer/counters with latches. Serial Data transfers are provided by a serial-to-parallel/parallel-to-serial shift register. Application versatility is further increased by various control registers, including an interrupt flag register, an interrupt enable register and two function Control Registers. Avaialable in a 40 lead plastic DIP, 44 lead PLCC, 44 lead QFP.

KEY FEATURES: ▲CMOS low power process with microamp standby current ▲Wide operating voltage range, 1.2-6.0V ▲Two 8-bit, bidirectional peripheral I/O Ports ▲Two powerful 16-bit programmable Interval Timer/Counters ▲Serial bidirectional peripheral I/O Port ▲Enhanced "handshake" feature ▲Latched Input/Output Registers on both I/O Ports ▲Programmable Data Direction Registers ▲Bus compatible with high-speed W65C02S and W65C816S.

Benchmarks

Execution speeds in microseconds at 8MHz operating frequency.

Operation	Data Type	WDC 65C816S 8MHz	Intel 8086 8MHz	Motorola MC68000 8MHz
Register to register move	Byte/word	0.25	0.25	0.50
	double word	0.50	0.50	0.50
Memory to register move	Byte/word	0.38/0.50	2.12/2.12	1.50/1.50
	double word	1.00	4.25	2.00
Add memory to register	Byte/word	.038/0.50	4.37/4.37	2.50/2.50
	double word	1.25	8.75	3.75
Compare memory to memory	Byte/word	0.75/1.00	2.25/2.25	1.50/1.50
	double word	2.00	4.50	2.25
Conditional Branch	Branch taken	0.38	1.00	1.25
	not taken	0.25	0.50	1.00
Modify index branch if zero	Branch taken	0.62	1.37	1.25
Branch to subroutine	Branch taken	0.75	2.37	2.25
Interrupt Latency	Interrupt	1.50	22.75	21.75

Power consumption is directly related to the number of active devices and to the speed of operation.

The differences between the device families is significant as can be seen when we compare the numbers of transistors on the CMOS versions of them as follows:

	65C816S	8086	68000
Number of transistors	21,000	100,000+	100,000+

EFA E2C EA-6B M1-A2 F18 F16 SH-60

MK50 ARC-210 AYK-14 OV-10D ALQ-149 Patriot

CH-46 F15-E HH60 KC-130 AH-1

CH-53 AV-8B GPWSII S3

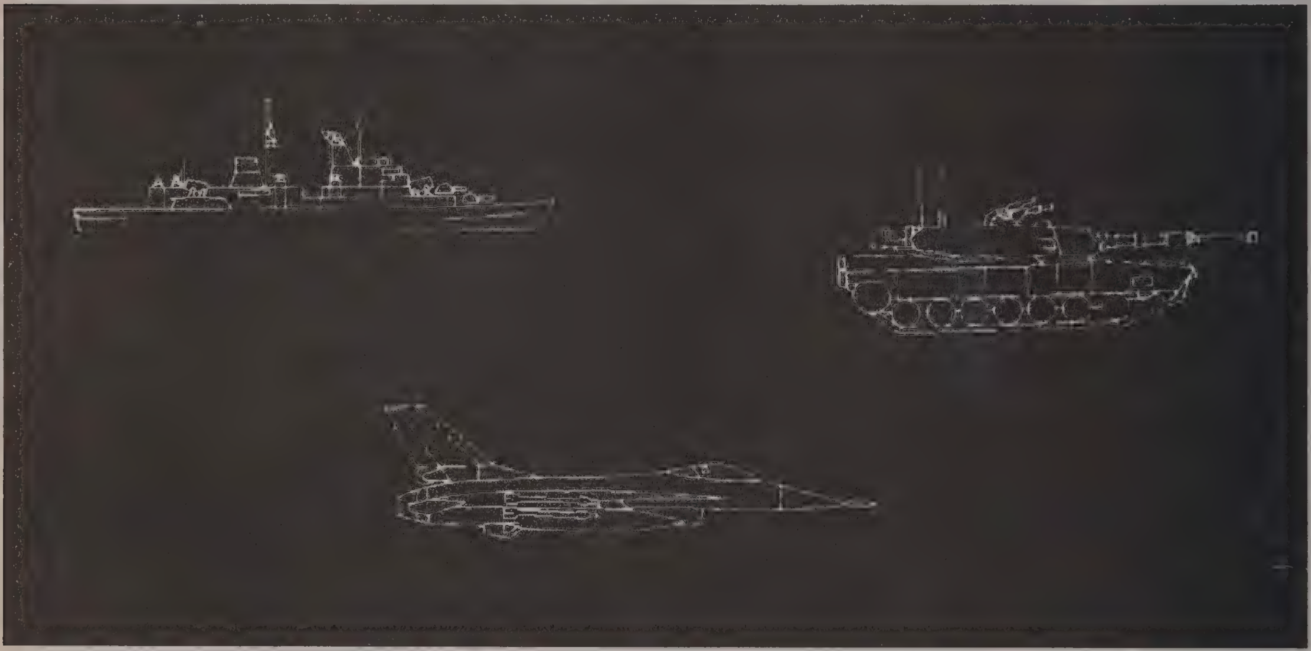
SAHRS P-3 F-14 ALQ-149 CAIS C-17

CPU-140 M1-A2 HARM

Rafale DSP RISC Futurebus+ Multimode

EPLRS F22 Cruise UYK44

White Technology



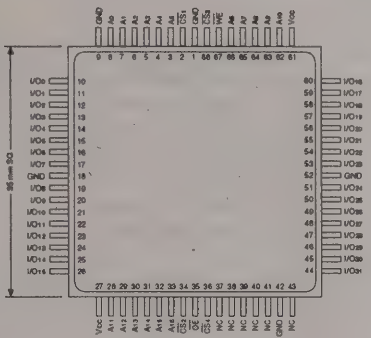
MIL-883 MEMORY

FOR CHALLENGING APPLICATIONS

WS-128K32-XG4X

4 Megabit CMOS SRAM Module

FEATURES


GND A0 A1 A2 A3 A4 A5 CS1 GND CS3 WE A6 A7 A8 A9 A10 Vcc
9 8 7 6 5 4 3 2 1 68 67 66 65 64 63 62 61
I/O0 10
I/O1 11
I/O2 12
I/O3 13
I/O4 14
I/O5 15
I/O6 16
I/O7 17
GND 18
I/O8 19
I/O9 20
I/O10 21
I/O11 22
I/O12 23
I/O13 24
I/O14 25
I/O15 26
60 I/O16
59 I/O17
58 I/O18
57 I/O19
56 I/O20
55 I/O21
54 I/O22
53 I/O23
52 GND
51 I/O24
50 I/O25
49 I/O26
48 I/O27
47 I/O28
46 I/O29
45 I/O30
44 I/O31
27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43
Vcc A11 A12 A13 A14 A15 A16 CS2 OE CS4 NC NC NC NC NC GND NC
35 mm SQ

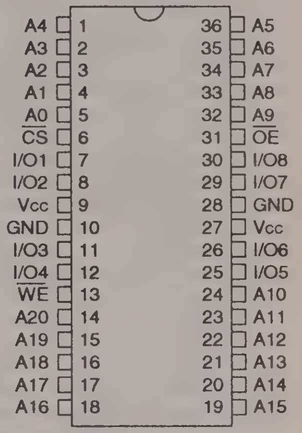
- Access Times of 25 to 120nS
- 68 lead, CQFP, 1.38 inch square Hermetic Gullwing Package
- Configurable as 128Kx32, 256Kx16 or 512Kx8
- Upgradable to 512Kx32 in same package.
- Commercial, Industrial and Military Temperature Ranges
- TTL Compatible Inputs and Outputs
- Low Power CMOS Fully Static Design
- 5 Volt Power Supply
- Built in Decoupling Caps and Multiple Ground Pins for Low Noise Operation

WS-2M8-XCX

2M x 8 CMOS SRAM Module

FEATURES

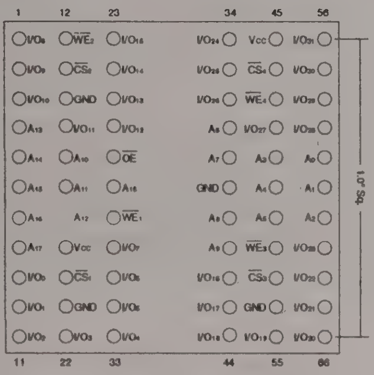
- Access Times 25 to 120nS
- 36 Pin DIP
- Hermetic Ceramic Package
- Full MIL Screening Available
- Low Power CMOS Fully Static Design
- Data Retention as low as 2.0 Volts


A4 1
A3 2
A2 3
A1 4
A0 5
CS 6
I/O1 7
I/O2 8
Vcc 9
GND 10
I/O3 11
I/O4 12
WE 13
A20 14
A19 15
A18 16
A17 17
A16 18
36 A5
35 A6
34 A7
33 A8
32 A9
31 OE
30 I/O8
29 I/O7
28 GND
27 Vcc
26 I/O6
25 I/O5
24 A10
23 A11
22 A12
21 A13
20 A14
19 A15

WS-512K32-XHX

16 Megabit CMOS SRAM Module

FEATURES


1 12 23 34 45 56
I/O8 WE2 I/O15 I/O24 Vcc I/O31
I/O9 CS2 I/O14 I/O25 CS4 I/O30
I/O10 GND I/O13 I/O26 WE4 I/O29
A13 I/O11 I/O12 A6 I/O27 I/O28
A14 A10 OE A7 A3 A0
A15 A11 A16 GND A4 A1
A16 A12 WE1 A8 A5 A2
A17 Vcc I/O7 A9 WE3 I/O23
I/O0 CS1 I/O6 I/O16 CS3 I/O22
I/O1 GND I/O5 I/O17 GND I/O21
I/O2 I/O3 I/O4 I/O18 I/O19 I/O20
11 22 33 44 55 66
1.0" Sq.

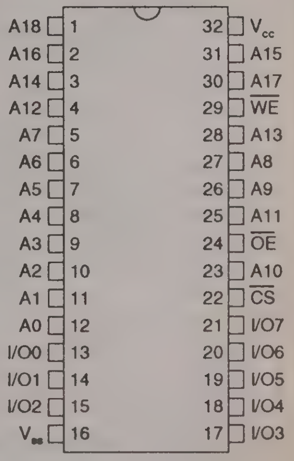
- Access Times of 25 to 120nS
- 66 Pin, PGA Type, 1.38 inch square HIP, Hermetic Ceramic Package
- Configurable as 512Kx32, 1024Kx16 or 2Mx8
- Battery Back-Up Operation
- Commercial, Industrial and Military Temperature Ranges
- TTL Compatible Inputs and Outputs
- Low Power CMOS Fully Static Design
- 5 Volt Power Supply
- Built In Decoupling Caps and Multiple Ground Pins for Low Noise Operation

WS-512K8-XPX

512K x 8 CMOS SRAM Module

FEATURES

- Access Times of 25 to 55nS
- 32 Pin DIP, JEDEC Pinout
- FR4/Plastic Package
- Commercial and Industrial Temperature Ranges
- 5 Volt Operation
- All CMOS Fully Static Design, No Clocks
- Battery Back-Up Operation
- TTL Compatible Inputs and Outputs
- Onboard Decoupling Capacitors


A18 1
A16 2
A14 3
A12 4
A7 5
A6 6
A5 7
A4 8
A3 9
A2 10
A1 11
A0 12
I/O0 13
I/O1 14
I/O2 15
Vss 16
32 Vcc
31 A15
30 A17
29 WE
28 A13
27 A8
26 A9
25 A11
24 OE
23 A10
22 CS
21 I/O7
20 I/O6
19 I/O5
18 I/O4
17 I/O3

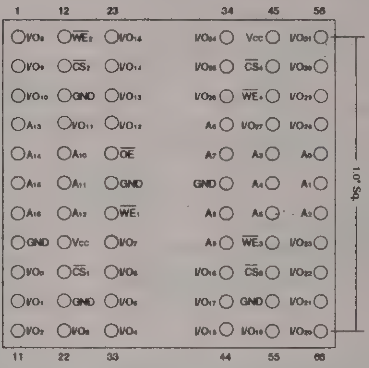
- Many WTI SRAM memory modules can be manufactured with radiation tolerant die for space applications. Contact factory for details and radiation information.
- WTI supplies full MIL-883 certified SRAM modules per EQC-92-138 and Standard Military Drawings: 5962-93156, 5962-93157 and 5962-92078.

White Technology, 4246 E. Wood Street, Phoenix, AZ 85040, (602) 437-1520, Fax: (602) 437-9120

WE-128K32-XHX

4 Megabit CMOS EEPROM Module

FEATURES

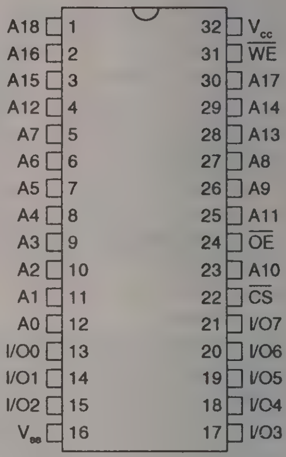

1 12 23 34 45 56
I/O8 WE2 I/O15 I/O24 Vcc I/O31
I/O9 CS2 I/O14 I/O25 CS4 I/O30
I/O10 GND I/O13 I/O26 WE4 I/O29
A13 I/O11 I/O12 A6 I/O27 I/O28
A14 A10 OE A7 A3 A0
A15 A11 GND GND A4 A1
A16 A12 WE1 A8 A5 A2
GND Vcc I/O7 A9 WE3 I/O23
I/O0 CS1 I/O6 I/O16 CS3 I/O22
I/O1 GND I/O5 I/O17 GND I/O21
I/O2 I/O3 I/O4 I/O18 I/O19 I/O20
11 22 33 44 55 66
1.0" Sq.

- Access Time of 150nS
- 66 Pin, PGA Type, 1.18 inch square HIP, Hermetic Ceramic Package
- Configurable as 128Kx32, 256Kx16 or 512Kx8
- Commercial, Industrial and Military Temp Ranges
- Low Power CMOS, 5mA Standby
- Automatic Page Write Operation
- Data Polling for End of Write Detection
- Hardware and Software Data Protection
- TTL Compatible Inputs and Outputs
- 5 Volt Power Supply
- Built In Decoupling Caps and Multiple Ground Pins for Low Noise Operation
- Data Retention @ 25°C, 10 Years
- Write Endurance, 10,000 Cycles

WE-512K8-XCX

512K x 8 CMOS EEPROM Module

FEATURES

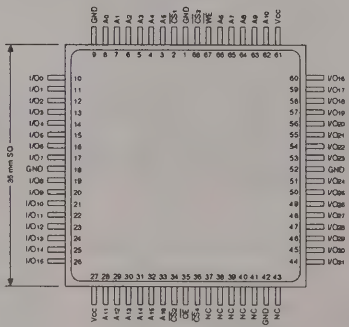

A18 1 32 V_{cc}
A16 2 31 WE
A15 3 30 A17
A12 4 29 A14
A7 5 28 A13
A6 6 27 A8
A5 7 26 A9
A4 8 25 A11
A3 9 24 OE
A2 10 23 A10
A1 11 22 CS
A0 12 21 I/O7
I/O0 13 20 I/O6
I/O1 14 19 I/O5
I/O2 15 18 I/O4
V_{ss} 16 17 I/O3

- SMD number 5962-93091
- Read Access Time 150nS
- JEDEC Standard 32 Pin DIP, Hermetic Ceramic Package
- Full Military and Industrial Temperature Ranges
- MIL-STD-883D Compliant Devices Available, QML 38534, EQC-92-070
- Low Power CMOS Operation: 3mA Standby Typical 80mA Operating Max.
- Automatic Page Write Operation Internal Address and Data Latches for 512 Bytes, 1 to 128 Bytes/Page, Four Pages
- Data Polling for End of Write Detection
- Hardware and Software Data Protection
- CMOS and TTL Compatible Inputs and Outputs
- Write Endurance 10,000 Cycles
- Data Retention at 25°C, 10 Years

WE-128K32-XG4X

4 Megabit CMOS EEPROM Module

FEATURES

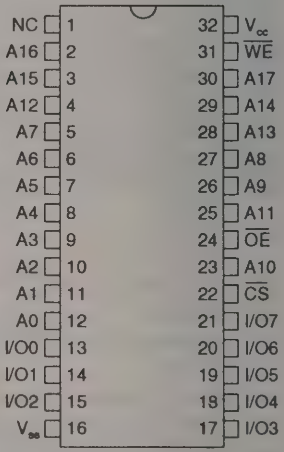

GND A0 A1 A2 A3 A4 A5 CS1 GND CS3 WE A6 A7 A8 A9 A10 Vcc
9 8 7 6 5 4 3 2 1 68 67 66 65 64 63 62 61
I/O0 10
I/O1 11
I/O2 12
I/O3 13
I/O4 14
I/O5 15
I/O6 16
I/O7 17
GND 18
I/O8 19
I/O9 20
I/O10 21
I/O11 22
I/O12 23
I/O13 24
I/O14 25
I/O15 26
60 I/O16
59 I/O17
58 I/O18
57 I/O19
56 I/O20
55 I/O21
54 I/O22
53 I/O23
52 GND
51 I/O24
50 I/O25
49 I/O26
48 I/O27
47 I/O28
46 I/O29
45 I/O30
44 I/O31
27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43
Vcc A11 A12 A13 A14 A15 A16 CS2 OE CS4 NC NC NC NC NC GND NC
35 mm SQ

- Access Times of 120nS, 150nS
- 68 lead, CQFP, 1.38 inch square, Hermetic Gullwing Package
- Configurable as 128Kx32, 256Kx16 or 512Kx8
- Commercial, Industrial and Military Temp Ranges
- Low Power CMOS 5mA Standby
- Automatic Page Write Operation
- Data Polling for End of Write Detection
- Hardware and Software Data Protection
- TTL Compatible Inputs and Outputs
- 5 Volt Power Supply
- Built In Decoupling Caps and Multiple Ground Pins for Low Noise Operation
- Data Retention @ 25°C, 10 Years
- Write Endurance, 10,000 Cycles

WE-256K8-XCX

256K x 8 CMOS EEPROM Module

FEATURES


NC 1 32 V_{cc}
A16 2 31 WE
A15 3 30 A17
A12 4 29 A14
A7 5 28 A13
A6 6 27 A8
A5 7 26 A9
A4 8 25 A11
A3 9 24 OE
A2 10 23 A10
A1 11 22 CS
A0 12 21 I/O7
I/O0 13 20 I/O6
I/O1 14 19 I/O5
I/O2 15 18 I/O4
V_{ss} 16 17 I/O3

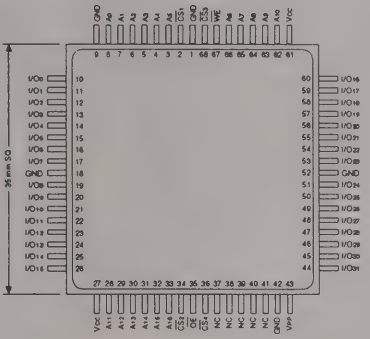
- SMD number 5962-93155
- Read Access Time 150nS
- JEDEC Standard 32 Pin DIP, Hermetic Ceramic Package
- Full Military and Industrial Temperature Ranges
- MIL-STD-883D Compliant Devices Available, QML 38534, EQC-92-070
- Low Power CMOS Operation: 10mA Standby Typical 90mA Operating Max.
- Automatic Page Write Operation Internal Address and Data Latches for 512 Bytes, 1 to 64 Bytes/Page, Eight Blocks
- Data Polling for End of Write Detection
- Hardware and Software Data Protection
- CMOS and TTL Compatible Inputs and Outputs
- Write Endurance 10,000 Cycles
- Data Retention at 25°C, 10 Years

White Technology, 4246 E. Wood Street, Phoenix, AZ 85040, (602) 437-1520, Fax: (602) 437-9120

WF-128K32-XG4X

4 Megabit CMOS Flash PROM Module

FEATURES

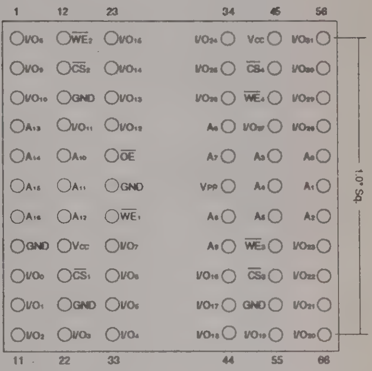

GND A0 A1 A2 A3 A4 A5 $\overline{CS_1}$ GND $\overline{CS_3}$ $\overline{WE}$ A6 A7 A8 A9 A10 Vcc
9 8 7 6 5 4 3 2 1 68 67 66 65 64 63 62 61
I/O0 I/O1 I/O2 I/O3 I/O4 I/O5 I/O6 I/O7 GND I/O8 I/O9 I/O10 I/O11 I/O12 I/O13 I/O14 I/O15
10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26
60 59 58 57 56 55 54 53 52 51 50 49 48 47 46 45 44
I/O16 I/O17 I/O18 I/O19 I/O20 I/O21 I/O22 I/O23 GND I/O24 I/O25 I/O26 I/O27 I/O28 I/O29 I/O30 I/O31
27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43
Vcc A11 A12 A13 A14 A15 A16 $\overline{CS_2}$ $\overline{OE}$ $\overline{CS_4}$ NC NC NC NC NC GND VPP
35mm SQ

- Access Times of 120, 150 and 200nS
- 68 lead, CQFP, 1.38 inch square Hermetic Gullwing Package
- Configurable as 128Kx32, 256Kx16 or 512Kx8
- Upgradable to 512Kx32 and 1Mx32, in same package.
- Commercial, Industrial and Military Temperature Ranges
- Low Power CMOS, 10mA Standby Typical
- 10,000 Erase/Program Cycles
- Hardware and Software Write Protection
- TTL Compatible Inputs and Outputs
- Built in Decoupling Caps and Multiple Ground Pins for Low Noise Operation

WF-128K32-XHX

4 Megabit CMOS Flash PROM Module

FEATURES


1 12 23 34 45 56
I/O8 $\overline{WE_2}$ I/O15 I/O24 Vcc I/O31
I/O9 $\overline{CS_2}$ I/O14 I/O25 $\overline{CS_4}$ I/O30
I/O10 GND I/O13 I/O26 $\overline{WE_4}$ I/O29
A13 I/O11 I/O12 A6 I/O27 I/O28
A14 A10 $\overline{OE}$ A7 A3 A0
A15 A11 GND VPP A4 A1
A16 A12 $\overline{WE_1}$ A8 A5 A2
GND Vcc I/O7 A9 $\overline{WE_3}$ I/O23
I/O0 $\overline{CS_1}$ I/O6 I/O16 $\overline{CS_3}$ I/O22
I/O1 GND I/O5 I/O17 GND I/O21
I/O2 I/O3 I/O4 I/O18 I/O19 I/O20
11 22 33 44 55 66
1.0" Sq.

- Access Times of 120, 150 and 200nS
- 66 Pin, PGA Type, 1.18 inch square HIP, Hermetic Ceramic Package
- Configurable as 128Kx32, 256Kx16 or 512Kx8
- Commercial, Industrial and Military Temperature Ranges
- Low Power CMOS, 10mA Standby Typical
- 10,000 Erase/Program Cycles
- Hardware and Software Write Protection
- TTL Compatible Inputs and Outputs
- Built in Decoupling Caps and Multiple Ground Pins for Low Noise Operation

Customer Specific Memory and Processor Modules

In addition to the above standard products, WTI offers custom MCM-C packaging capability:

- Wider Organizations - x36, x72, etc.
- Mixed Memories in the same package
- Memory, ASIC, and support logic in same MCM-C package.
- Microprocessor and Memory Combinations
- Package type based on through hole or surface mount, JEDEC, industry standard or customer specific.

White Technology, Inc.
A wholly owned subsidiary of Bowmar Instrument Corporation
4246 East Wood Street Phoenix, Arizona 85040
Tel: 602-437-1520 Fax: 602-437-9120

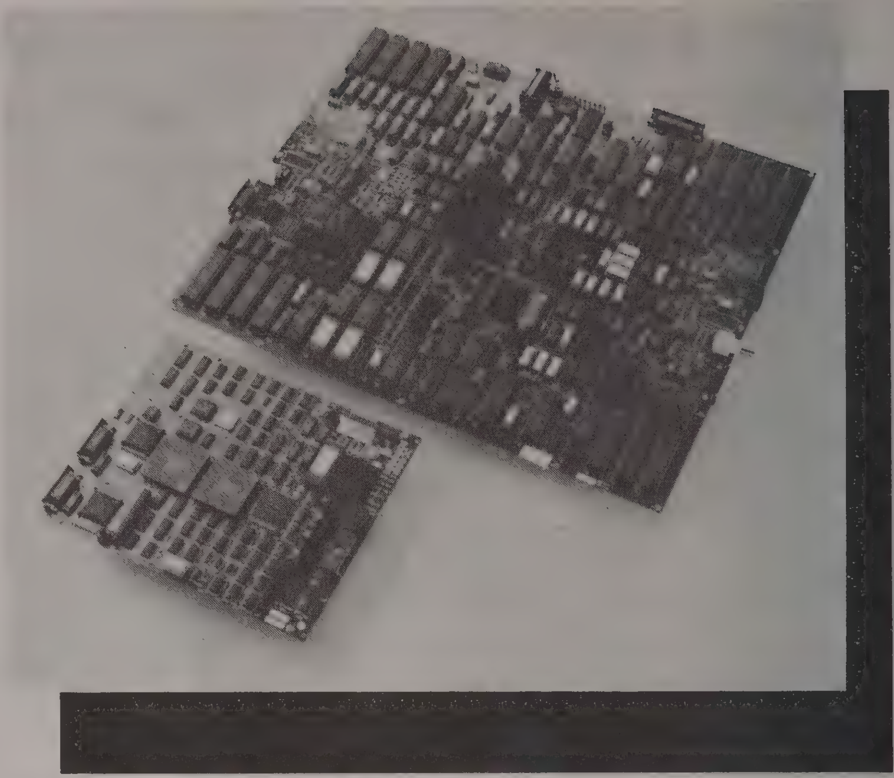
XC4000 FPGA Family

Unique on-chip system features produce the industry's highest integration FPGA.

The newest Xilinx FPGA family introduces several industry firsts for FPGA devices. The XC4000 Family integrates unique system features on-chip, and delivers the highest level of system integration in any field programmable device. In addition, our XACT® development system has been tailored to support these XC4000 features. The result – much lower chip count, easier design implementation, and greatly improved system performance.

On-Chip System Features:

- User-programmable RAM
- Wide-edge decoders
- Dedicated carry logic
- Eight dedicated clock nets
- JTAG boundary scan
- Internal 3-state busses
- 12/24 mA output current



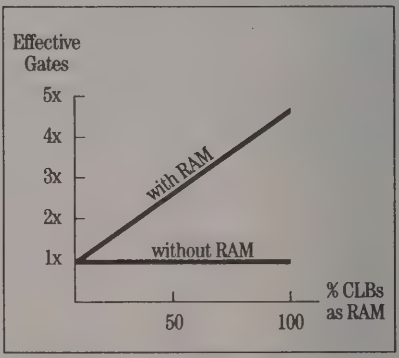
User-programmable RAM

Historically, small, fast and inexpensive RAM has not been available as an on-chip system design resource. By providing programmable logic and programmable memory on the same chip, the XC4000 Family redefines the design methodology used in developing overall system and board architectures.

Functions that were previously designed using many internal registers or expensive off-chip SRAMs – like deep register files, small FIFOs, and multiple accumulators – are now more easily implemented and significantly faster with the XC4000 programmable memory resource. An example is a 256 x 9 FIFO which, when designed on an XC4010™, runs well in excess of 25 MHz and occupies less than 20% of the device.

Additionally, the XACT development system software provides an easy to use memory compiler (MEMGEN), complete with custom RAM symbol and automatic logic/memory partitioning.

Benefits of On-Chip RAM

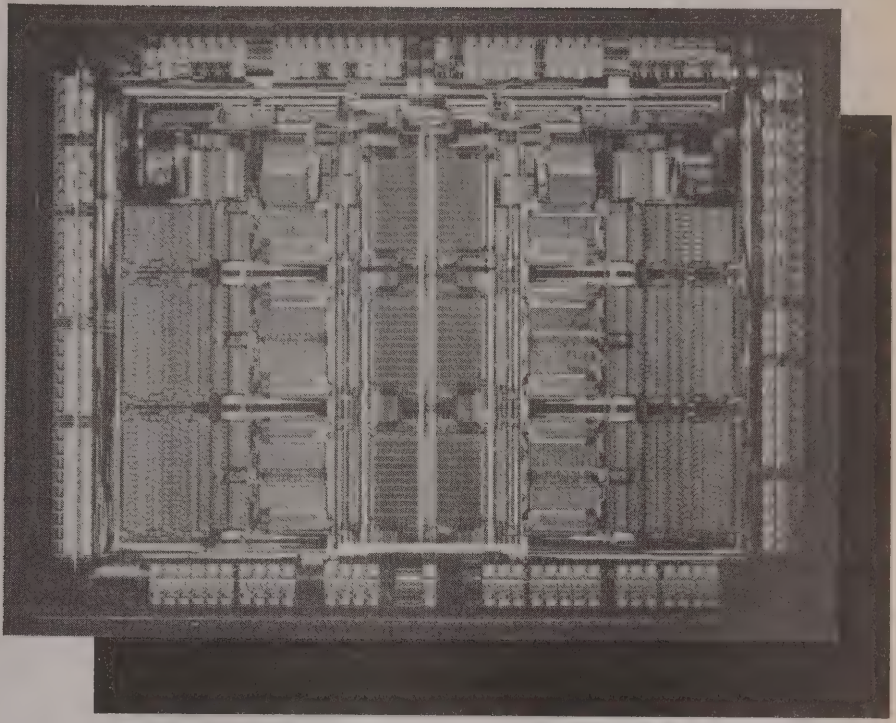


On-chip RAM provides dramatic increase in gate utilization.

XILINX INC., 2100 LOGIC DRIVE, SAN JOSE, CA 95124 (408) 559-7778

XC7300 EPLD Family

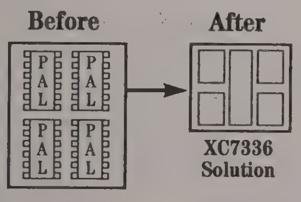
XILINX®



High speed, high density EPLDs provide the best solution for PAL® conversion

In today's competitive market, designers rely on increased levels of product integration to reduce board space, cost and power, while minimizing time-to-market. In particular, users of multiple low-density PALs are turning to more complex devices to meet these goals. With a PAL-like architecture and easy-to-use software, the XC7300 EPLD family offers the *best* solution for converting multiple PALs or GALs to a single complex programmable logic device. Its unique Dual-Block™ architecture delivers both high speed and logic density while minimizing the risk of changing technologies.

Direct PAL Conversion



	Before	After
Cost	1 X	0.5-0.75 X
Power	1,800 mW	625 mW
Space	1.58 in^2	0.48 in^2

X3215

PAL Conversion Highlights

- PAL conversion without redesign
- 100% routing via the UIM™. Guarantees that once PALs are converted to XC7300 function blocks they can be interconnected as they appear in the original design.
- Automatic PAL conversion software directly converts PAL designs to XC7300 family devices.
- Fast Function Blocks work as high speed PAL targets, with <10 ns pin-to-pin delay and >80 MHz cycle time.
- High density function blocks work as complex PAL targets. With up to 17 product terms per output, they operate at greater than 55 MHz, *including interconnect.*
- Conversion software requires less than 5 minutes to convert, optimize and map PALs into an EPLD.

System Feature Highlights

- Dual Block architecture is *fast and complex.*
- User selectable I/O allows 3.3 volt or 5 volt I/O operation.
- Simplified system interface with embedded ALUs, input registers, and multiple clocking options.
- High performance 0.8 micron CMOS EPROM technology for high reliability and reprogrammability.
- Supported by the low cost, menu driven DS550 translator and the new Xilinx Base Development System.
- Programmable power management allows control of speed and power on a macrocell by macrocell basis.

XILINX INC., 2100 LOGIC DRIVE, SAN JOSE, CA 95124 (408) 559-7778

XILINX®

Family Architecture Comparison

	EPLDs		FPGAs	
	XC7200 Family	**XC7300 Family**	**XC2000/L XC3000/A/L XC3100 Family**	**XC4000/A/H Family**
Architecture	PAL-like, AND-OR plane Macrocells and product terms	Advanced PLD – high speed, high density function blocks (FB) in the same device	Gate array – like Many small blocks	Gate array – like Many small blocks
Logic Capacity	36 – 72 macrocells Integrate 4 – 8 PAL/ 22V10s	36 – 144 macrocells Integrate 4 – 16 PAL/ 22V10s	800 – 9,000 gates Integrate TTL, MSI, PLDs	2,000 – 13,000 + gates Integrate TTL, MSI, PLDs, RAM
Design Timing	Fixed, PAL-like 60 MHz – predictable for most applications	Fixed, PAL-like 80 MHz – predictable for most applications	Gate array-like – depends on application Can be >100 MHz, typically 25 – 40 MHz (XC3000) or 50 – 80 MHz (XC3100)	Gate array-like – depends on application Can be >100 MHz, typically 30 – 50 MHz
Number of I/Os	Fewer – like EPLD/PAL 36 – 72	38 – 156	Many – like gate array 58 – 176	Many – like gate array 64 – 192
Number of FF	Fewer – like EPLDs 72 – 144	36 – 234	Many – like gate array 122 – 1,320	Very large number - 256 – 1,536 plus on-chip RAM - up to 18.4 K bits
Power Consumption	0.5 – 1.25 W static 0.75 – 1.5 W typical	0.4 – 2.0 W static 0.5 – 2.25 W typical Programmable power management	Very low, mW static Dynamic – depends on application 0.12 – 1.0 W typical	Very low, mW static Dynamic – depends on application 0.25 – 2.0 W typical
System Features	Arithmetic carry logic 100% interconnect guaranteed ALU per macrocell	Like XC7200 plus: Carry look ahead High output drive	Two global clock buffers Programmable output slew rate Internal 3-state busses Power-down mode 8 mA output drive for XC3100	Eight global clock buffers Programmable output slew rate Internal 3-state busses RAM for FIFOs and registers JTAG for board test Fast carry logic for arithmetic Wide decode 12 mA output drive, 24 mA per pair (24 mA/48 mA for A/H families)
Process	CMOS EPROM	CMOS EPROM	CMOS static RAM	CMOS static RAM
Programming Method	PROM programmer OTP or UV erasable Configuration on chip	PROM programmer OTP or UV erasable Configuration on chip	Programmed in circuit Four modes Configuration stored externally	Programmed in circuit Six modes Configuration stored externally
Re-programmable	Yes – after UV erasure	Yes – after UV erasure	Yes – in milliseconds Reprogrammable in circuit	Yes – in milliseconds Reprogrammable in circuit
Factory Tested	Yes	Yes	Yes	Yes
Key Applications	Complex state machines Complex counters Bus & peripheral interface Memory control PAL-cruncher Accumulators/ incrementors Magnitude/window comparators	High speed graphics Multiport memory controllers High speed bus interface 50 MHz, 16 bit accumulators	Simple state machines General logic replacement Reprogrammable applications Battery-powered logic 3 V operation Very fast counters	Simple state machines Complex logic replacement Board integration Adders/comparators Reprogrammable applications RAM application: FIFOs, buffers Fast/compact counters JTAG boards Bus interfacing

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Speed and Density

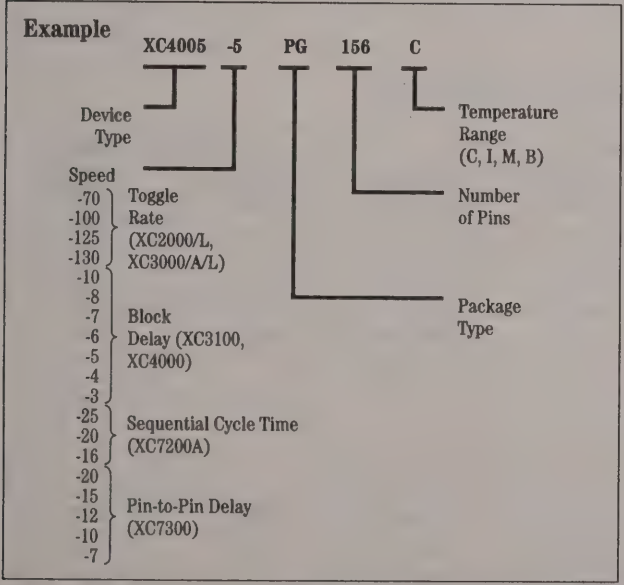
	EPLDs			FPGAs		
	XC7200A (-16)	XC7336 (-7)*	XC7354 (-10)	XC3000 (-125)	XC3100 (-3)	XC4000 (-5)
16-Bit Synchronous Binary Counter	60 MHz	83 MHz	83 MHz	51 MHz 24 CLBs	102 MHz 24 CLBs	111 MHz 17 CLBs
16-Bit Unidirectional Loadable Counter Max Density Max Speed	60 MHz 60 MHz	83 MHz 83 MHz	83 MHz 83 MHz	18 MHz 16 CLBs 32 MHz 24 CLBs	31 MHz 16 CLBs 55 MHz 24 CLBs	43 MHz 9 CLBs 43 MHz 9 CLBs
16-Bit U/D Counter Max Density Max Speed	60 MHz 60 MHz	83 MHz 83 MHz	83 MHz 83 MHz	15 MHz 16 CLBs 30 MHz 27 CLBs	28 MHz 16 CLBs 50 MHz 27 CLBs	43 MHz 9 CLBs 43 MHz 9 CLBs
8:1 Multiplexer	22 ns	7.5 ns	10 ns	16 ns 8 CLBs	10 ns 8 CLBs	16 ns 5 CLBs
12-Bit Decode From Input Pad	22 ns	7.5 ns	10 ns	15 ns 4 CLBs	12 ns 4 CLBs	12 ns 0 CLBs
16-Bit Accumulator	17 MHz	n/a	51 MHz	21 MHz 29 CLBs	36 MHz 29 CLBs	39 MHz 9 CLBs
Data Path [1]	60 MHz	83 MHz	83 MHz	50 MHz 16 CLBs	95 MHz 16 CLBs	85 MHz 12 CLBs
Timer Counter [2]	60 MHz	83 MHz	83 MHz	28 MHz 23 CLBs	52 MHz 23 CLBs	40 MHz 12 CLBs
State Machine [3]	60 MHz	83 MHz	83 MHz	18 MHz 34 CLBs	30 MHz 34 CLBs	31 MHz 25 CLBs
Arithmetic [4]	12 MHz	n/a	31 MHz	17 MHz 23 CLBs	29 MHz 23 CLBs	20 MHz 16 CLBs
16 Channel, 32-Bit DMA	n/a	n/a	n/a	n/a n/a	n/a n/a	20 MHz 72 CLBs

* Estimated

Notes:
1. 32 inputs, 4:1 mux, register, 8-bit shift register
2. 8-bit T/C, latch, mux, compare
3. 16 states, 40 transistions, 10 inputs, 8 outputs
4. 4x4 multiplier, 8-bit accumulator

A. Benchmark data, including design files is available in the XAPP Application Handbook and on the Xilinx bulletin board as XAPP files.
B. System speeds for slower parts (e.g. -100, -70) can be approximated by derating with the ratio (e.g. 0.67 for -100, 0.47 for -70).
C. All speeds are worst case temperature and voltage.

Ordering Information


Example
XC4005
-5
PG
156
C
Device Type
Speed
-70
-100
-125
-130
-10
Toggle Rate (XC2000/L, XC3000/A/L)
-8
-7
-6
-5
-4
-3
Block Delay (XC3100, XC4000)
-25
-20
-16
Sequential Cycle Time (XC7200A)
-20
-15
-12
-10
-7
Pin-to-Pin Delay (XC7300)
Package Type
Number of Pins
Temperature Range (C, I, M, B)

XC1700 Serial PROMs (for configuration storage)

		PACKAGE OPTIONS			
Device	Density	PD8	SO8	DD8	PC20
XC1718D	18K	X	X	X	X
XC1736D	36K	X		X	X
XC1765D	64K	X		X	X
XC17128	128K	X		X	X

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Product Comparison

		Typical Gates	Typical Gates Using RAM	Max I/Os	Flip-Flops	RAM bits	Macrocells	Available CLBs
EPLDs	**XC7200A Family**							
	XC7236A	1600	n/a	36	68	n/a	36	n/a
	XC7272A	3200	n/a	72	126	n/a	72	n/a
	XC7300 Family							
	XC7336	1000	n/a	48	36	n/a	36	n/a
	XC7354	2200	n/a	66	108	n/a	54	n/a
	XC7372	3000	n/a	84	126	n/a	72	n/a
	XC73108	4600	n/a	120	198	n/a	108	n/a
	XC73144	6200	n/a	156	234	n/a	144	n/a
FPGAs	**XC2000 Family**							
	XC2064/L	0.8K–1.8K	n/a	58	122	0	n/a	64
	XC2018/L	1.2K–1.5K	n/a	74	174	0	n/a	100
	XC3000/XC3100 Family							
	XC3020/A/L/XC3120	1.3K–1.8K	n/a	64	256	0	n/a	64
	XC3030/A/L/XC3130	2.0K–2.7K	n/a	80	360	0	n/a	100
	XC3042/A/L/XC3142	2.0K–3.7K	n/a	96	480	0	n/a	144
	XC3064/A/L/XC3164	4.0K–5.5K	n/a	120	688	0	n/a	224
	XC3090/A/L/XC3190	5.0K–7.5K	n/a	144	928	0	n/a	320
	XC3195	6.5K–9.0K	n/a	176	1,320	0	n/a	484
	XC4000 Family							
	XC4002A	1.6K–2.0K	2.2K–2.8K	64	256	2,048	n/a	64
	XC4003/XC4003A	2.5K–3.0K	3.5K–4.2K	80	360	3,200	n/a	100
	XC4003H	2.5K–3.0K	3.5K–4.2K	160	200	3,200	n/a	100
	XC4004A	3.2K–4.0K	4.6K–5.6K	96	480	4,608	n/a	144
	XC4005/XC4005A	4.0K–5.0K	6.0K–7.0K	112	616	6,272	n/a	196
	XC4005H	4.0K–5.0K	6.0K–7.0K	192	392	6,272	n/a	196
	XC4006	5.0K–6.0K	7.5K–8.5K	128	768	8,192	n/a	256
	XC4008	6.5K–8.0K	9.7K–11.2K	144	936	10,368	n/a	324
	XC4010	8.0K–10.0K	12.0K–14.0K	160	1,120	12,800	n/a	400
	XC4013	10.0K–13.0K	12.0K–16.0K	192	1,536	18,432	n/a	576

* Assumes 10% of device used as RAM.

XC2000/XC3000 Product Family Extension Summary

	5-Volt Applications				3-Volt Applications	
Family	**XC2000**	**XC3000**	**XC3000A**	**XC3100**	**XC2000L**	**XC3000L**
Speed (T_{ILO})	5.5 ns	5.5 ns	4.1 ns	**2.7 ns**	9.5 ns	6.7 ns
Density Range (Available CLBs)	64 - 100	64 - 320	64 - 320	**64 - 484**	64 - 100	64 - 320
Cost	**Lowest**	Low	Low	Medium	**Lowest**	Low
Special Features						
-Optimized Routing			✓			✓
-Bitstream Error Checking			✓			✓
-Enhanced ESD Protection			✓			✓
-8 mA I/O Drive				✓		
Advanced Packaging	VQFP		VQFP	VQFP	VQFP	VQFP
Low Power (I_{CCPD})	500 µA	250 µA	**50 µA**	5 mA	**10 µA**	**10 µA**

Package Options

		Surface Mount					Thru-hole	
		PLCC	PQFP	TQFP	VQFP	CQFP	PGA	BGA
	Standard	JEDEC	EIAJ	EIAJ	EIAJ	JEDEC	JEDEC	JEDEC
	Lead Pitch	50 mil	0.65/0.5 mm	0.5 mm	0.5 mm	25 mil	100 mil	1.5 mm
	Body	Plastic	Plastic	Plastic	Plastic	Ceramic	Ceramic/Plastic	FR4
	Temp Options	C, I	C, I	C, I	C, I,	M, B	C, I, M, B	C,
	Ordering Code	PC	PQ	TQ	V, Q	CB	PG, PP	WB, PB
EPLD Family	**XC7236A**	44						
	XC7272A	68, 84					84	225
	XC7336	44						
	XC7354	44, 68						
	XC7372	68, 84						
	XC73108	84	160				144	225
	XC73144						184	225
FPGA Family	**XC2064/L**	44, 68					68	
	XC2018/L	44, 68, 84		100	64, 100		84	
	XC3020/XC3120	68, 84	100	100		100	84	
	XC3030/XC3130	44, 68, 84	100	100	64		84	
	XC3042/XC3142	84	100	100	100	100	84, 132	
	XC3064/XC3164	84	160	144			132	
	XC3090/XC3190	84	160, 208			164	175	
	XC3195	84	160, 208				175, 223	
	XC4002A	84	100	100			120	
	XC4003/A	84	100	100		100	120	
	XC4003H		208				191	
	XC4004A	84	160	144			120	
	XC4005/A	84	160, 208	144		164	156	
	XC4005H		240				223	
	XC4006		160, 208				156	
	XC4008		208				191	
	XC4010		208			196	191	
	XC4013		208, 240				223	

I/O Pins Per Package

Package Pins/ Type		EPLD Family							FPGA Family																	
		XC7236A	XC7272A	XC7336	XC7354	XC7372	XC73108	XC73144	XC2064	XC2018	XC3020/A/L/XC3120	XC3030/A/L/XC3130	XC3042/A/L/XC3142	XC3064/A/L/XC3164	XC3090/A/L/XC3190	XC3195	XC4002A	XC4003/A	XC4003H	XC4004A	XC4005/A	XC4005H	XC4006	XC4008	XC4010	XC4013
Max I/O		36	72	48	60	84	120	156	58	74	64	80	96	120	144	176	64	80	160	96	112	192	128	144	160	192
44	PC WC	36		48	38				34	34		34														
48	PD								38	38																
64	VQ								54	54	54	54														
68	PC PG WC		56		58				58	64	58	58														
84	PC PG WC		72				72			74	64	74	74	70	70	70	61	61		61	61					
100	PQ TQ CB VQ CQ									74	64	80	82				64	77								
120	PG																64	80		95						
132	PG PP												96	110												
144	TQ PG						120						96	120						96	112					
156	PG																				112		125			
160	PQ						120							120	138	138				96	112		128			
164	CB CQ														144						112					
175	PG														144	144										
176	TQ													120	144											
191	PG																		160					144	160	
196	CB																							144	160	
208	PQ MQ														144	176			160		112		128	144	160	160
223	PG														175							192				192
224	CB																									192
225	BG																								160	192
225	WB PB						120																			
240	PQ MQ																					192				192

Base Development System

XILINX®

Low cost, entry-level, PC-based software for designing with Xilinx EPLDs and FPGAs

The Base Development System provides PAL and TTL logic designers with an extremely cost-effective, easy-to-use migration path to EPLD and FPGA architectures. Using a familiar design methodology, the software supports nine Xilinx devices and offers a complete OrCAD® or Viewlogic Systems™ interface. The many benefits of programmable logic, including higher logic integration and greater system performance, can now be realized *without* making a major software investment.

Product Highlights

- Supports multiple technologies — Xilinx EPLDs *and* FPGAs.
- Cost effective. Get started with programmable logic for under $1,000.
- Wide variety of device support — from XC7200 and XC7300 EPLDs to XC2000, XC3000 and XC3100 FPGAs (up to XC3130).
- Includes interfaces to OrCAD or Viewlogic schematic capture and simulation tools.

The Base Development System provides a cost-effective migration path to Xilinx EPLDs and FPGAs

One Design Environment Supports Xilinx FPGAs *And* EPLDs

Now you can design with a wide range of programmable logic devices using one development system. The Base Development System supports Xilinx EPLDs and FPGAs, up to 3,000* gates in density. In addition, the XACT® Design Manager provides a common user interface, so there's no need to learn a different development system environment.

Breaking The Software Price Barrier

In the past, moving up to advanced programmable logic meant increasing your budget. Not any more. At $995, the Base Development System provides a low-cost, efficient way to get started with programmable logic. What's more, the Base Development System supports eight different devices ranging from the advanced XC7200 and XC7300 series EPLDs to the high speed XC3100 FPGAs. As the adjacent table indicates, dozens of packaging options are available for these devices.

* See chart below for actual devices supported.

Devices Supported	Packages				
EPLDs:	PLCC	PQFP	TQFP	CQFP	PGA
XC7236/36A™	✓				✓
XC7272™	✓				✓
XC73108™	✓	✓			✓
FPGAs:					
XC2018™	✓		✓		✓
XC2064™	✓				✓
XC3020™	✓	✓		✓	✓
XC3030™	✓	✓	✓		✓
XC3120™	✓	✓		✓	✓
XC3130™	✓	✓		✓	✓

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Xilinx and Third-Party Options for Designing Xilinx Devices

	OrCAD		Viewlogic						Mentor V8		Synopsys
	PC		PC			WS-Sun 4			WS-HP700 Sun 4, Apollo		WS-HP700 Sun 4, Apollo
EPLD Families	Base	Standard	Base	Standard	Extended	Base	Standard	Extended			
XC7236 XC7272 XC73108		░		░	▓		░	▓	CYQ194		
FPGA Families	Base	Standard	Base	Standard	Extended	Base	Standard	Extended	Standard	Extended	Standard
XC2064/L XC2018/L		░		░	▓		░	▓	░	▓	░
XC3020/L/A XC3030/L/A XC3042/L/A XC3064/L/A XC3090/L/A		░		░	▓		░	▓	░	▓	░
XC3120 XC3130 XC3142 XC3164 XC3190 XC3195		░		░	▓		░	▓	░	▓	░
XC4002A XC4003/3A XC4003H* XC4004A XC4005/5A XC4005H* XC4006 XC4008 XC4010 XC4013*		░		░	▓		░	▓	░	▓	░
X-BLOX (XC4000 only)					▓			▓		▓	
Stand-alone (S) System Options			/S Base	/S Std	/S Ext						
Schematic capture Simulator (<5000 gates) Simulator (unlimited) VHDL symthesis				░	▓						

Package Features

Base	Standard	Extended
• EPLD device support (PC only) • FPGA devices (up to XC3130) • Libraries and interface • FPGA & EPLD core implementation software • 6 month support for PC • 12 month support & updates for workstation	• EPLD device support (PC only) • FPGA devices XC2000, XC3000, XC3100, XC4000 • Libraries and interface • FPGA & EPLD core implementation software • 12 month support & updates	• EPLD device support (PC only) • FPGA devices XC2000, XC3000, XC3100, XC4000 • Libraries and interface • FPGA & EPLD core implementation software • X-BLOX architectural synthesis • 12 month support & updates

Stand-alone (S) System Features

Stand-alone Base	*Stand-alone* Standard	*Stand-alone* Extended
Includes all the Base Development System features plus: • Schematic editor (ViewDraw) • Simulator, 5000 gate limit (ViewSim) • 12 month support & updates for PC	Includes all the Standard Development System features plus: • Schematic editor (ViewDraw) • Simulator, unlimited (ViewSim)	Includes all the Extended Development System features plus: • Schematic editor (ViewDraw) • Simulator, unlimited (ViewSim) • Synthesis (ViewSynthesis)

* Integrated product release Q1 '94, order seperately if required.

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Alliance Program – Companies and Products

Company	Product Name	Version	Function	Vendor Interface Name	Libraries 2K/3K	Libraries 4K	X-BLOX Entry
Accel	Tango	1.3	Schematic Entry	SCH2XNF	✓	✓	
ALDEC	Susie	6.12	Simulation	SusieXNF	✓	✓	-
Altium	P-CAD	6.0	Schematic Entry	PC-Xilinx	✓	Q4	
Cadence (Valid)	Concept	1.3	Schematic Entry	Xilinx Front End	✓	✓	✓
	Rapidsim	2.0	Simulation	Xilinx Front End	✓	✓	-
	Composer	4.2	Schematic Entry	Xilinx Front End	✓	✓	✓
	Verilog	1.6	Simulation	Xilinx Front End	✓	✓	-
Compass	Asic Navigator		Capture/ Synthesis/ Simulation	Xilinx Design Kit	Q4	Q4	
CV (Prime)	Design Entry	2.0	Schematic Entry	Xilinx Kit	✓	✓	
Data I/O	FutureNet 6.0	5.03	Schematic Entry		✓	✓	✓
	ECS	2.41	Schematic Entry	Xilinx Library	✓	✓	
EPS	SIMETRI	2.0	Simulation	XNF2SIM	✓	✓	-
Exemplar Logic	CORE	1.2	Synthesis	FS-001	✓	✓	
GenRad	System Hilo	4.3	Simulation	Xilinx Tool Kit	✓	✓	-
IKOS	IKOS 2800/2900	5.02	Hardware Accelerator	Xilinx Tool Kit	✓	✓	-
	Voyager	1.2	VHDL Simulation	Xilinx Tool Kit	✓	✓	-
Intergraph	ACE Plus	4.7.5.5	Schematic Entry	Xilinx Design Kit 2.0	✓	✓	✓
	Advansim	7.0	Simulation	Xilinx Design Kit 2.0	✓	✓	-
ISDATA	LOG/iC	3.4	Synthesis	XNF-PP	✓	✓	-
Logic Modeling	SmartModel Library	-	Simulation Models	(In Library)	✓	✓	-
	LM1200	-	Hardware Modeler	Xilinx Logic Module	✓	✓	-
MINC	PLDesigner-XL	3.0	Synthesis	Xilinx Design Module	✓	✓	-
Nishimura	G-DRAW	5.0	Schematic Entry	GDL2XNF	✓	✓	
	G-LOG	4.03	Simulation	XNF2GDL	✓	✓	-
Omation	Schema III	3.34	Schematic Entry	Schema Xilinx Interface	✓	✓	Q4
Phase Three Logic	CapFast	2.2	Schematic Entry	SCH2XNF	✓	✓	
Quad Design (ViewLogic Division)	Motive	3.4 Plus	Timing Analysis	XNF2MTV	✓	✓	-
Racal-Redac	Visula	5.2	Schematic Entry	Xilinx Design Kit	✓	✓	
	CADAT	8.1&2000	Simulation	Xilinx Design Kit	✓	✓	-
	Silcsyn	2.1	Synthesis	Xilinx Design Kit			-
Simucad	Silos III	92.115	Simulation	Included	✓	✓	-
Teradyne	Case Vanguard	4.1	Schematic Entry	Vanguard I/F Kit	✓	✓	
	Lazar	6.4	Simulation	Laser I/F Kit	✓	✓	-

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YAMAHA INTEGRATION

Seeking the best in sound reproduction, Yamaha has captured sound as digital information and created its own sound-oriented semiconductor technology.

Through this digital sound processing technology, Yamaha has mastered the art of making sophisticated LSI chips for ...

• CD players • Digital Audio •
• Audio/Visual System •
• Graphic Processing • Communications •
• Multimedia PC Sound • Custom Applications •

SOUND for PC and Game

DEVICE NAME	PACKAGE	DESCRIPTION	FEATURES
NEW YMF278 (OPL4)	80-pin QFP	FM + PCM single chip synthesizer	• Backward compatible with OPL2 and OPL3 • 24-voice Wavetable synthesizer • Digital mixing of FM and Wavetable synthesizer
NEW YAC513 (DAC)	16-pin DIP 16-pin SOP	2-channel floating D/A converter	• DAC for YMF278 • 16-bit dynamic range
NEW YRW801	44-pin SOP	Wavetable ROM	• OPL4 Wavetable Library for General MIDI
NEW YSS225 (EP)	100-pin QFP	Effect processor	• Reverberation, delay, flange, distortion, autopanning • 4 stereo channels in, 2 stereo channels out • Use 2 or 4 256k external pseudo-SRAMs
YMF262 (OPL3)	24-pin SOP	FM Operator Type-L3	• Register compatible with YM3812 (OPL2). • Maximum 6 sounds in 4 operator. • "18 melody sounds" or "15 melody sounds with 5 rhythm" in 2 operator. • 4 channel output.
YAC512 (DAC)	16-pin SOP	2-channel floating D/A converter	• DAC for YMF262 • 16-bit dynamic range
YMZ263B (MMA)	64-pin QFP	Multimedia audio & game interface controller	• 22.05K, 11.025K, 7.35K, 5.5125KHz record/play-back in 4-bit ADPCM. • 44.1K, 22.05K, 11.025K, 11.025K, 7.35KHz record/play-back in 12-bit PCM. • Directly connected with PC bus, DMA/CPU data transmission mode through built-in 2-channel 128-byte FIFO. • UART and 16-byte FIFO for MIDI. • Game port.
YM3802 (MCS)	40-pin DIP 64-pin QFP	MIDI communication and service controller	• For Musical Instrument Digital Interface. • Asynchronous serial communication interface. • Frequency divider circuit for baud-rate generation. • Interface with magnetic tape.
YM3812 (OPL2)	24-pin DIP 24-pin SOP	FM Operator Type-L2	• FM sound generator system for realistic sound. • "9 melody sounds" or "6 melody sounds with rhythm" in 2 operator.
YM3014B (DAC-SS)	8-pin DIP 16-pin SOP	Serial input floating D/A converter	• DAC for YM3812. • 16-bit dynamic range.
YMU251XXX (FMM2)	16-pin DIP	Custom FM Sound melody generator	• Built-in ROMs for tones and melody. • 4 sound generated simultaneously. • Maximum 8 songs can be included. • Output for external control. • +3V single power supply.
NEW YMZ280 (PCMD8)	64-pin QFP	8-channel PCM/ADPCM sound generator	• 4-bit ADPCM or 8/16-bit PCM • Wavedata (maximum 44, 1KHZ) in external ROM or SRAM • Pitch change, panpot
YM6616	64-pin QFP	ADPCM sound analysis/synthesis	• 4 bit ADPCM sound analysis/synthesis. • Interface to external DRAM and ROM (up to 4Mbit). • Maximum sampling frequency: 20kHz (øM=10MHz). • Control by 4 bit CPU possible. • Repeated playback possible

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COMMUNICATION

DEVICE NAME	PACKAGE	DESCRIPTION	FEATURES
YM7405 (IDNDCH)	80-pin QFP	ISDN basic access interface with D channel packet	• For ISDN user-network interface (Full-Duplex, 4-Wire). • Full support of layer 1 and layer 2 (LAP-D protocol). • Layer 3 processor interface function, built-in analog driver and receiver. • Power-down mode.
NEW YTD402 (TA110)	44-pin QFP	V110, X30 Terminal Adaptor	• Bit rate adaption according to CCITT V.110 and X.30 • Synchronous 600, 1200, 2400, 4800, 7200, 9600, 14.4K, 19.2K, 48K, 56K, 64K. • Asynchronous 50, 75, 110, 150, 200, 300, 600, 1200, 2400, 3600, 4800, 7200, 9600, 14.4K, 19.2K. • V.24 and X.21 interfaces. • AT command, X.21 and V.25bis calling procedure support.
NEW YTM403B (MD9624)	64-pin SDIP 64-pin QFP 64-pin TQFP	Single chip FAX/DATA/VOICE modem (FAXVOdem)	• CCITT V.29/V.27ter/V.26bis/V.23/V.22bis/V.22/V.21. • BELL 212A/202/103. • Built-in voice data recording and playback (PCM/ADPCM). • Power-down/power-save mode.
NEW GTM407 (MC9642)	80-pin QFP 80-pin SQFP	FAXVOdem controller	• Built-in microcontroller : driver for FAX VOdemware. — Hayes AT command sets for autodialer and Voice extensions. — TIA/EIA-578 (Class 1) and TIA/EIA-592 (Class 2.0) communication standard with ECM. — V.42bis error correction, data compression, and MNP1-5. • 16550 UART registers.
YM7109C (MD96FX)	40-pin DIP 64-pin QFP 68-pin PLCC	Single chip 9600bps fax modem	• For Group 3 Fax. • Synchronous half-duplex 9600bps/7200bps/4800bps/2400bps/300bpx (CCITT V.29, V.27ter, V.21ch2, V.23 backward ch, V.21). • Duplex tone generation, tone detection, DTMF detection function. • +5V single power-supply, Low power consumption (typ. 200mW).
YTM401 (MD96DX)	40-pin DIP 64-pin QFP 68-pin PLCC 44-pin TQFP	Single chip 9600bps fax modem	• Pin layout and software upper compatible with YM7109 • Power down mode. • External clock synchronization. • HDLC function. • External input/output port.
YTF409 (FAXCE)	100-pin QFP	Group 3 Fax controller	• Group 3 Fax transmission procedure (T.30) in External EPROM. • Band compression function (MH encoding method). • Modem interface for YM7109. • Image sensor interface (CCD/CIS). • Thermal head interface • Pulse motor interface. • Extension memory interface up to 8Mbyte. • Host CPU interface.
YTM414 (MD96LX)	44-pin TQFP 64-pin QFP	9600bps fax modem	• Pin layout & software compatible with YTM401 • Power saving functions • 3.3V or 5.0V • For Group 3 Fax. • HDLC function. • UART functions.

GRAPHICS

DEVICE NAME	PACKAGE	DESCRIPTION	FEATURES
V9990 (E-VDP-III)	128-pin QFP	Video display processor	• 2 types of pattern display mode for games. • 4 types of bit map display mode for NTSC or PAL monitor of audio-visual equipment. • 2 types of bit map display mode for high resolution monitor of office automation equipment.
YGV604 (VSG)	100-pin QFP	Video screen generator	• 2 types of bit map display mode for NTSC and PAL. • Smooth scrolling, Superinpose. • Linear RGB output.
YGV605 (PVDC)	80-pin QFP	Pattern mode video display controller	• Able to drive a variety of display equipments. • 1 pattern graphic plane (scroll screen) and 64 sprite planes (movable screens). • Built-in VRAM, External ROM data transfer function. • Devided screen scrolling. • Linear RGB output.
NEW YGV606 (AVDP)	80-pin QFP	Advanced video display processor	• Bit map display mode for NTSC and PAL. • Smooth scrolling, Sprite display. • Use external 1M/4M DRAM. • Linear RGB output.
V9958 (E-VDP-II)	64-pin SDIP	Video display processor for new media	• Display up to 256 colors simultaneously. • Linear RGB output. • Superimposing and digitizing. • Display 8 sprites for each horizontal line. • Vertical and horizontal scroll.
V6366C (PCDC)	100-pin QFP 84-pin PLCC	Panel and CRT display controller	• IBM CGA/MDA and HGC (Hercules) compatible. • For CRT, LCD, plasma and EL. • Convert (640 x 200) data to (640 x 400 or 640 x 350) resolution. • Chinese characters display function.

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AV SYSTEM

DEVICE NAME	PACKAGE	DESCRIPTION	FEATURES
NEW YSS220 (SP3)	64-pin QFP	Digital surround Processor	• Analog input/output by means of built-in 15-bit A/D, D/A converter. • Sampling frequency of 32kHz. • Up to 512ms delay with a 256k DRAM. • Programmable surround parameters. • Easy control by built-in preset data.
YM7128B (SP2)	16-pin DIP 24-pin SOP	Digital surround processor	• Built-in over-sampling filter. • Digital delay, mixing volume and feed back loop programmable. • Analog input/output by means of built-in 14-bit A/D, D/A converter. • 100ms digital delay for Hi-Fi and 200ms for microphone echo.
YM7306C (DPLD)	64-pin QFP	Dolby Pro Logic decoder	• Realization of Dolby Pro Logic decoder in 1-chip. • Built-in direction emphasizing circuit, noise sequencer, 7kHzLPF, modified B-type N.R., A/D, D/A converters. • Sound-field simulation by using up to 370ms digital delay..
YSS215 (AVSP)	64-pin QFP	Dolby Pro Logic decoder	In addition to functions of YM7306, • Capable of mising 8 taps at surround channel in Dolby Pro Logic mode. • Built-in Auto Input Balance circuit. • Sound-field simulation by using 29 taps.
YSS205B (KP)	16-pin DIP	Karaoke processor	• Key control, Microphone echo, voice canceler and digital surround are integrated in 1 chip. • Digital input/output as well as analog input/output. • 5 operation modes.
YSS216B (KP2)	64-pin QFP	Karaoke processor	• Key control, microphone echo and voice canceler in 1 chip. • Digital input/output, Analog input. • Easy operation with a small number of parameters.
YSS222 (KPB)	16-pin DIP 16-pin SOP	Key controller	• Analog input/output 1-channel key controller. • Various control modes, Usable without microprocessor.
YM3411 (SP)	16-pin DIP	Digital surround processor	• Built-in under-sampling filter and over-sampling filter. • Programmable digital delay and mixing volume. • Analog input, analog output by means of built-in 14-bit A/D, D/A converter. • Up to 30ms digital delay.
YM3428 (SP-B)	16-pin DIP	Digital Surround processor	• Built-in over sampling filter. • Programmable digital delay and mixing volume. • Analog input, analog output by means of built-in 14-bit A/D, D/A converter. • Up to 30ms digital delay.
YM6063B (CDC)	80-pin QFP	Data controller for CD-I or CD-ROM	• Real time error detection and correction (hardware) for CD-I or CD-ROM. • Capable of interfacing to CD audio signal processing format of any manufacturer. • ADPCM data transferred directly to YM6064 (ADP).
YM6064 (ADP)	80-pin QFP	ADPCM audio signal processor for CD-I	• Convert CD-I format ADPCM data into 16-bit linear PCM data. • Built-in circuit for digital mixing real time audio and sound map audio. • Built-in double over-sampling digital filter for the CD-I format level C.
YM7302 (MPC)	100-pin QFP	Master peripheral controller for CD-I	• Direct interface to 68000MPU. • Mouse, DMA, timer, interrupt handler and other circuits are built in.
YVZ152B (CDGD)	64-pin QFP	CD Graphics Decoder	• Deinterleave, error detection and correction for CD subcode R-W. • Interface with the subcode output from the CD signal processor. • 256K DRAW connected. • Interface with digital audio interface receiver YM3623 and YM3436. • Linear RGB output.
YVL151D (LVP)	80-pin QFP	Video signal processor for LD	• Jitter absorption by means of digital TBC, Spindle servo control. • Digital processing drop-out compensation, Adaptable noise reduction; Built-in video DAC. • C&A code decode, 24 character x 10 line character generator.
YM3558 (FMDET)	16-pin DIP	FM detector for LD video signal	• FM demodulate video signal by pulse count method. • 4 channel contained.
YM7110 (LVFM)	24-pin DIP	Digital FM detector of LD analog sound signal	• FM demodulate analog sound signal as a digital data. • Built-in CX-NR decoder. • Output digital audio interface signal in combination with YSD221.
YM6020 (VMC)	80-pin QFP	Video memory controller for LD	• Digital screen processing with specified A/D, D/A and 2 x 1Mbit VRAM. • Built-in 22 character x 7 line character generator. • Video processing of still picture and multi-speed playback in combination with YVL151.

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DIGITAL AUDIO

DEVICE NAME	PACKAGE	DESCRIPTION	FEATURES
YDC103 (SPC7)	80-pin QFP	CD servos and digital signal processing	• Built-in digital PLL and 16K SRAM. • Signal processing for EFM demodulation and error correction • Focus, tracking, feed and disk servo control. • Built-in 3-order sigma-delta DAC. Digital audio interface output.
YM7121C (SPC-5)	80-pin QFP	CD servos and digital signal processing	• Built-in 16K SRAM and VCO. • Signal processing for EFM demodulation error correction. • Focus, tracking, feed and disk servo control. • 4-times oversampling digital filter. Digital audio interface output.
GDR101 (ASP)	48-pin QFP	CD Player servo signal processing IC	• Built-in most of analog system functions, such as RF amplifier, focus and tracking preamplifier. • Built-in analog switch which operates according to FCS, TROF, TRHD or TRGL from digital signal processing LSI. • Output of each timing signal of FRF, /FZC, HF and TER to digital signal processing LSI.
YSF210B (OSF22)	24-pin DIP	2-channel 8-times oversampling digital filter	• Signal processing with 20-bit input, 22-bit output (fs+32~48kHz). • Operated by system clock independent of seriel input clock. • Stop band attenuation at least 100 dB, pass band ripple within ±0.00005dB.
YM3433B (ALCDF)	16-pin DIP 24-pin SOP	2-channel 8-times oversampling digital filter	• Operated by system clock independent of input serial signals. • Signal processing of MSB first serial signal with 32kHz-48kHz sampling frequency. • Stop band attenuation at least 70dB and pass band ripple within ±0.002dB, 18-bit output selectable for PCM58.
YM3434 (AFUDF)	16-pin DIP	2-channel 8-times oversampling digital filter	• Operated by system clock independent of serial input signals. • Signal processing of MSB first serial signal with 32kHz-48kHz sampling frequency. • Stop band attenuation at least 100dB and pass band ripple within ±0.0001dB, 18-bit output selectable for PCM58.
YM3414 (ACDDF)	16-pin DIP	2-channel 8-times oversampling digital filter	• Signal processing of MSB first serial signal with 32kHz-48kHz sampling frequency. • Stop band attenuation at least 100dB and pass band ripple within ±0.0001dB, 18-bit output selectable.
YM3404B (CDDF)	16-pin DIP	2-channel 4-times oversampling digital filter	• Signal processing of MSB first serial signal with 32kHz-48kHz sampling frequency. • Stop band attenuation at least 99dB and pass band ripple within ±0.0001dB, 18-bit output selectable.
YM3437C (DIT2)	16-pin DIP 16-pin QFP	Digital audio interface transmitter	• Modulation for digital audio interface signal. • Usable for 24-bit. • Setting of precise control code possible for both professional and consumer products.
YSD221 (DIT3)	16-pin DIP 16-pin SOP	Digital audio interface transmitter	• Modulation for digital audio interface signal. • Full digitalization of multidisk player sound signal in combination with YM7110.
YM3436D (DIR2)	44-pin QFP	Digital audio interface receiver	• Demodulation of digital audio interface signal by means of built-in PLL circuit. • Usable for 24-bit. • Output of precise control code possible for both professional and consumer products.
YM3623B (DIR)	28-pin DIP	Digital audio interface reciever	• Follows automatically to 32kHz-48kHz sampling frequency input signal by built-in PLL circuit. • MSB first serial DAC signal output, CD sub-code output, error monitor output terminal provided.
YAC502 (FDSM2)	44-pin QFP	2-channel 1-bit digital-to-analog converter	• 3-order sigma-delta digital-to-analog converter. • Built-in 8-times oversampling digital filter.
YM3412B (COMP)	18-pin DIP 24-pin SOP	Compressor and digital volume.	• For 2 channel, 16-bit, MSB first digital signal. • Automatically compresses dynamic range according to input signal level (4 types of compression characteristics selectable). • Digital volume control by 0.375dB step with compressor function.
YM3608 (DEQ)	24-pin DIP	Digital equalizer	• Microprogram and coefficients are controlled with serial interface. • Multiple 16-bit data by 32-bit coefficient with one clock. • Multiple 32-bit data by 32-bit coefficient with two clock. • Microprogram up to 128 steps.
NEW YSF224 (SAP)	16-pin DIP 16-pin SOP	Sound analysis processor	• Band pass filtering and level detection for spectrum analysis. • Programmable pass band frequency by digital filtering. • Output level data to microcontroller by 3dB.

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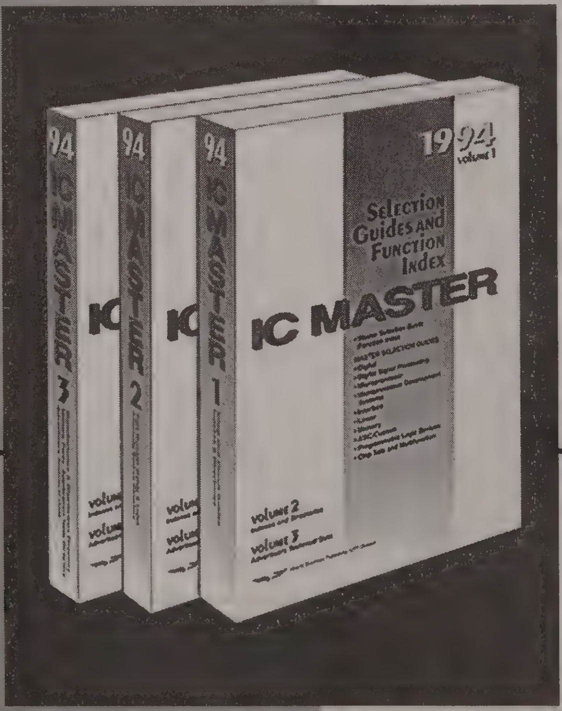

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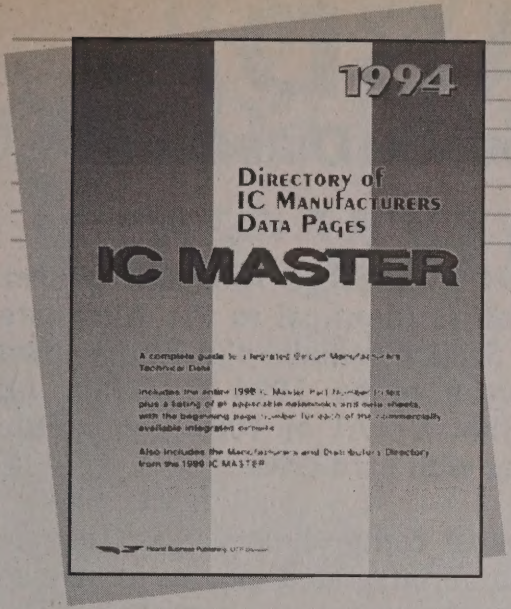

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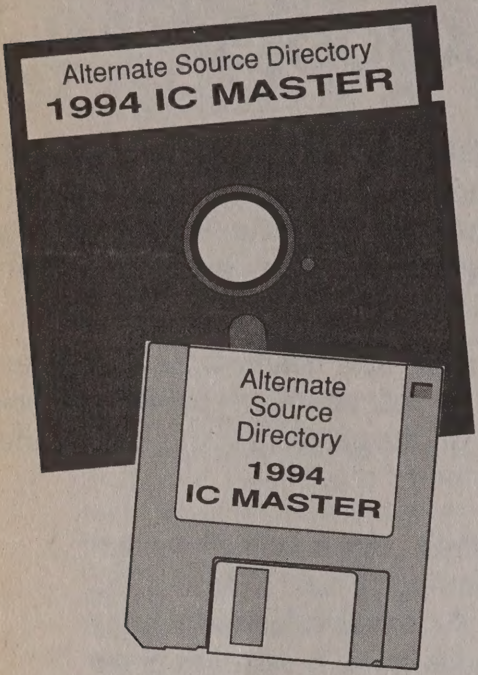

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